Advant® OCS

S600 I/O Hardware

Reference Manual

Use of **DANGER**, **WARNING**, **CAUTION**, and **NOTE**

This publication includes, **DANGER**, **WARNING**, **CAUTION**, and **NOTE** information where appropriate to point out safety related or other important information.

DANGER	Hazards which could result in severe personal injury or death
WARNING	Hazards which could result in personal injury
CAUTION	Hazards which could result in equipment or property damage
NOTE	Alerts user to pertinent facts and conditions

Although **DANGER** and **WARNING** hazards are related to personal injury, and **CAUTION** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all **DANGER**, **WARNING**, and **CAUTION** notices.

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Chapter 1 Introduction

1.1 Before You Begin

Advant OCS is a system for industrial automation. It consists of a family of computer-based units and a local area network for communication.

A controller is a computer-based unit in which control applications are running. A controller is connected to the process via the process I/O hardware.

This manual describes the S600 I/O, which beside S800 I/O is the process I/O hardware for the Advant Controller 110. Within the manual, all components of the S600 I/O are listed in alphabetical order. For each I/O module, you will find technical data, examples of how to connect it to the process, and a description of its functions.

1.2 How To Use This Book

Basic Structure

This book is organized into chapters and sections as shown in Figure 1-1.

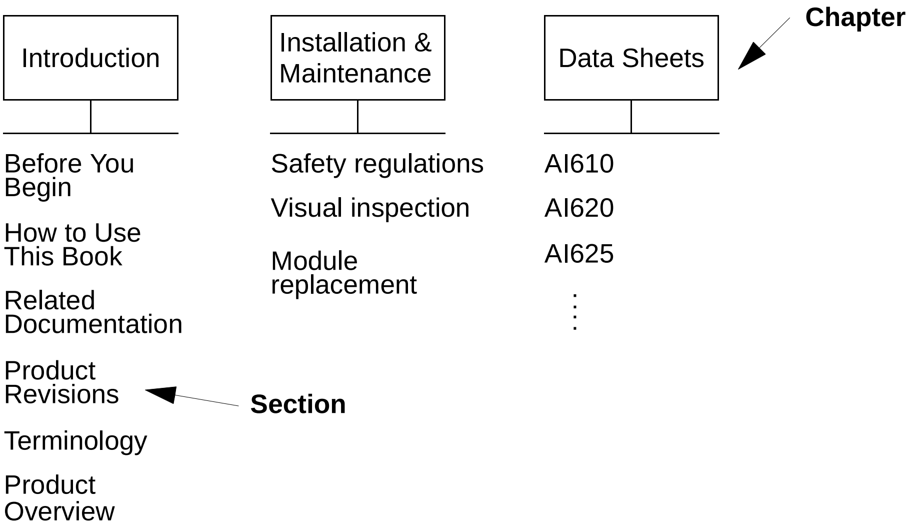


Figure 1-1. Manual Organization Structure

Introduction

Chapter 1 (this chapter) provides introductory and background information, including:

- Guidelines on how you can find information in this manual.
- This manual’s relationship to other Advant Controller 110 documents.
- A glossary defining terms frequently used in this manual.
- A product and functional overview. Read this to get an idea of which components belong to the S600 I/O and what they do.

Installation and Maintenance

In chapter 2 you will find general regulations and guidelines about installation and maintenance of the S600 I/O including

- Safety regulations
- Guidelines for visual inspection
- Guidelines for module replacement

Data sheets

In chapter 3 you will find data sheets of all components of the S600 I/O. They are listed in alphabetical order.

In general, a data sheet contains the following informations:

- Summary
- Associated data base elements
- Technical data
- Front view
- Process connections
- Functional description

1.3 Related Documentation

Table 1-1. Related Documentation

Category	Title	Description
Hardware	-	-
Station	Advant Controller 110 User‘s Guide	User‘s Guide containing a description of Advant Controller 110 and its functions.
	Advant Station 100 Series Engineering Station	Contains a description of the basic functions, connection and start-up and how to work with the main functions.
	AdvaBuild for Windows Function Chart Builder	Describes how to program an Advant Controller.
	Source Code Handling	This manual contains descriptions of and instructions for source code handling of PC programs and data base. Chapter 3 Source Code Design is also valid for Advant Controller 110.
	PC Elements AC 100 Series	Data for all PC elements in AC 110
	Data Base Elements AC 100 Series	Data for all Data Base elements in AC 110
	AMPL Application Building	Basic manual covering the use of the application program language AMPL
	AMPL Configuration Advant Controller 100 Series	Instructions for the configuration and application programming of AC 110 systems using Advant Station 100 Series Engineering Station.
Software	-	-

Table 1-1. Related Documentation (Continued)

Options	RCOM AC 110	Contains technical descriptions, instructions for configuration, installation, start-up and fault tracing of RCOM in AC 110
	MultiVendor Interface MODBUS AC 110	Contains technical descriptions, instructions for configuration, installation, start-up and fault tracing of MODBUS in AC 110
	MultiVendor Interface Siemens 3964 (R) AC 110	Contains technical descriptions, instructions for configuration, installation, start-up and fault tracing of Siemens 3964(R) in AC 110
	Advant Fieldbus 100	Describes how to configure, install and maintain communication using Advant Fieldbus 100
	MasterFieldbus and S400 I/O	Contains technical descriptions, instructions for installation, commissioning, fault tracing and technical data of MasterFieldbus.
Other	ABB Master Enviromental Immunity, Data Sheet	The enviromental immunity of the ABB Master system is described in this data sheet
	Interference-Free Electronics Design and applications	Philosophy, theory design and applications of EMC on equipment and systems. Valid for all ABB Process Automation systems.

1.4 Product Revisions

The product revision (release designation) of a S600 I/O module can be seen using the Advant Station 100 Series Engineering Station. The functions *Report Errors* and *Diagnose Module* both will show the type, variant and revision of a S600 I/O module as in Figure 1-2.

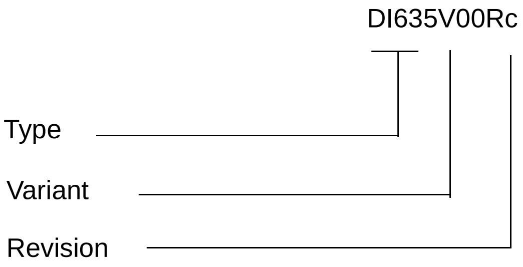


Figure 1-2. Example of Product Revision of a S600 I/O module

The variant indicates the firmware or hardware function variants of the same module type (e.g CI532V01 provides RCOM protocol function, CI532V02 provides MODBUS I protocol function).

The *Release Note* for a specific release of Advant Controller 110 includes a list, showing which product revision of a S600 I/O module matches with that AC110 release. Consult this list, when you want to replace the Advant Controller 110 Base software by another one with a different release.

1.5 Terminology

The following is a list of terms associated with AC 110 that you should be familiar with.

Term	Description
AC 110	**A**dvant **C**ontroller **110**
AF 100	**A**dvant **F**ieldbus **100**
AMPL	The **A**BB **M**aster **P**rogramming **L**anguage is used for application programming.
Application Program	An application program is a general concept of an assembly of program functions aimed at realizing and automating an addressed process control function.
Application (user-built)	An application is a user-implemented configuration of standard hardware and software units. It is the solution to the user's problem.
AS 100ES	**A**dvant **S**tation **100** Series **E**ngineering **S**tation
Backplane	A backplane is part of a subrack which interconnects inserted electronics *modules* with the help of a communication bus.
Base Station	The station containing the main CPU is called base station.
Basic Subrack	The subrack housing the main CPU is called basic subrack.
Basic System	Basic system is the abstract name of a minimal composition of functional units forming a system.
Basic Unit	Basic unit is used for ordering purposes (e.g., in the Price Book) as a name for the smallest unit to be ordered or a platform for further enlargement with alternatives and options.
Cabinet	The cabinet is the outer case of a piece of equipment (a packaging option), e.g., Controller cabinet, I/O cabinet.
CPU, Central **P**rocessing **U**nit	A CPU is a functional unit consisting primarily of a microprocessor and memory.
Circuit Breaker	In the context of a process control system, a circuit breaker is a device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overload of current, without injury to itself.
Cold Start	Cold start resets hardware and software of a *controller* to their initial states. In case of Advant Controller 110, application software is loaded from the internal PROM to RAM of the CPU.

Term	Description
Controller	Controller is a descriptive name for Advant Controller products. A controller is an entity in which control applications are running. From the product viewpoint, a controller consists of *CPU*, communication and certain auxiliary equipment such as power supply. It also includes the functionality of process I/O (the process data communication software). It does not include process I/O hardware (and firmware as applicable). C.f., *Process station*.
Engineering Station	In the following chapters this term is used as an abbreviation for Advant Station 100 Series Engineering Station
ESD	**ESD** stands for **E**lectro**S**tatic **D**ischarge.
I/O	I/O is process **I**nput or **O**utput. From the functional and geographical distribution viewpoint, process I/O is distinguished into two main categories - central (located close to the controller) - distributed (in the process environment)
Initialization	Initialization sets a starting position.
LED	**L**ight **E**mitting **D**iode
Local Control, local operator	Local control is a mode of operation where responsibility is assigned to an operator/equipment located in the process environment close to the process object.
Module	A module is a hardware unit, with or without accommodated software, or a software unit. There are modules of various sizes and functionality. Examples of hardware modules: *Subrack*, *submodule carrier*, communication module, I/O module. Examples of software modules: Basic system program module in a controller, a PC element.
Multi-drop Connection	A multi-drop connection is a means of establishing a multi-drop network, i.e., a network with two endpoint *nodes*, any number of intermediate *nodes* and only a single path between any two *nodes*.
Node	A node in general: A point in a data network. A node in an application: 1. Any logically addressable unit directly connected to the plant or *control network*. Examples are controller, process station, operator station. 2. Any logically addressable unit connected via RCOM.

Term	Description
Off-line	With off-line configuration, configuration data is created outside the application for later installation, or the internal configuration data is directly affected, but the application is inactive.
On-line	With on-line configuration, the internal configuration data of a system application is directly affected, while the application is active.
Position	Position means: 1. The place in the subrack where you put a *module*. 2. The place in a *submodule carrier* where you put a submodule (submodule position).
Process Object	A process object is process concept/equipment, e.g., valve, motor, conveyor, tank.
Process Station	Process station is a descriptive name for Advant products. A process station is an entity in which control applications are running. It includes the process I/O. C.f., *controller.*
RAM	**R**andom **A**ccess **M**emory
Redundancy	Redundancy in general means the existence of more than one capability of an item (system, apparatus, component) to perform its intended function.
Re(start)	Phases of the re(start) process include, e.g., power-up diagnostics and node initialization. In case of Advant Controller 110 during the initialization phase a *cold start* or *warm start* is performed depending on START MODE selector of the CPUl.
Submodule Carrier	A submodule carrier is a module (circuit board) which houses smaller *modules* (submodules):
Subrack	According to IEC 916, subracks (equipment frames) are the mechanics which house rows of modules. Different types of subracks are available, e.g., basic subrack, extension subrack.
Warm Start	In case of Advant Controller 110 the system software of the CPU restarts the application program without initializing its variables.

1.6 Product overview

The S600 I/O is highly modularized and flexible so that the I/O modules can be combined to suit many applications. The S600 I/O is used by the AC 110 as its I/O device. Please refer to the *Advant Controller 110 User‘s Guide* for more information about the AC 110.

1.6.1 Hardware Components listed in functional groups

By way of introduction, see below a complete list of all types of hardware components related to the Advant Controller 110 and S600 I/O. They are listed in functional groups.

A reference is given telling you where to find a module description, including important technical data:

- S600 refers to this manual, chapter 3 *Data Sheets*.
- AC110 refers to *Advant Controller 110 User’s Guide*
- MasterFieldbus refers to *MasterFieldbus and S400 I/O*

Table 1-2. Hardware components listed in functional groups

Type	Denomination	Reference to description
	Analog input modules	
AI610	Analog input module	S600
AI620	Analog input module	S600
AI625	Analog input module	S600
AI630	Analog input module	S600
AI635	Analog input module	S600
	Analog output modules	
AO610	Analog output module	S600
AO650	Analog output module	S600
	Digital input modules and pulse counter modules	
DI610	Digital input module	S600
DI620	Digital input module	S600
DI621	Digital input module	S600
DI622	Digital input module	S600
DI635	Digital input module	S600
DI636	Digital input module	S600

Table 1-2. Hardware components listed in functional groups (Continued)

Type	Denomination	Reference to description
DI650	Digital input module	S600
DI651	Digital input module	S600
DI652	Digital input module	S600
DP620	Pulse counter module	S600
	Digital output modules	
DO610	Digital output module	S600
DO620	Digital output module	S600
DO625	Digital output module	S600
DO630	Digital output module	S600
	Processor modules	
PM632	Processor module	AC110
PM633	Processor module	AC110
	Communication (modules, cables, terminators etc.)	
TK612	Bus cable	S600
CI610	Bus extender module for I/O station	S600
CI615	Bus extender module for base station	S600
TK610	Bus extension cable	S600
TC610	Terminator for bus extension	S600
CI626	AF 100 communication module (coax cable)	S600
CI627	AF 100 communication module (twisted pair)	S600
TC630	Modem for Advant Fieldbus 100 optical link	Advant Fieldbus 100
CI670	MasterFieldbus communication module (slave)	S600
TC670	Passive terminator for MasterFieldbus SDB	S600
CI671	MasterFieldbus communication module (master)	S600
DSTC 404	Powered terminator for MasterFieldbus SDB	MasterFieldbus
DSTC 406	Passive terminator for MasterFieldbus SDB	MasterFieldbus
DSTC 451	Overvoltage protector for MasterFieldbus	MasterFieldbus
DSTC 456	Multiplexer for redundant MasterFieldbus	MasterFieldbus

Table 1-2. Hardware components listed in functional groups (Continued)

Type	**Denomination**	**Reference to description**
DSTC 452	Modem for MasterFieldbus coax link (LDB)	MasterFieldbus
DSTC 454L	Modem for MasterFieldbus optical link (LDB)	MasterFieldbus
SC610	Submodule carrier	S600
CI532V01	RCOM communication submodule	RCOM AC 110
CI532V02	MODBUS communication submodule	MultiVendor Interface MODBUS AC 110
CI532V03	Siemens 3964R communication submodule	MultiVendor Interface Siemens 3964R AC 110
	Power supply (modules, distribution units, cables etc.)	
SA610	Power supply module	S600
SA161	Power supply	AC110
SA162	Power supply	AC110
SA171	Power supply for field devices	AC110
SA172	Power supply for field devices	AC110
SX540	Power switch and distribution unit	AC110
SX542	Power distribution unit	AC110
SX554	Distribution unit 60 V d.c.	AC110
TK615	Station voltage cable	S600
SB610	Lithium battery for PM632	AC110
SB611	Battery for PM633	AC110
	Other components	
RF615	Basic subrack	S600
RF620	Extension subrack	S600
RC610	Cable duct	S600
RC620	Fan unit	S600
TF620	Front connector for I/O modules	S600
TK630	Process cable with front connector	S600
TK640	Screened process cable with front connector	S600
RB601	Dummy module	S600

1.6.2 Hardware Components listed in alphabetical order

By way of introduction, see below a complete list of all types of hardware components related to the Advant Controller 110 and S600 I/O. They are listed in alphabetical order.

A reference is given telling you where to find a module description, including important technical data:

- S600 refers to this manual, chapter 3 *Data Sheets*.
- AC110 refers to *Advant Controller 110 User's Guide*
- MasterFieldbus refers to *MasterFieldbus and S400 I/O*

Table 1-3. Hardware components listed in alphabetical order

Type	Denomination	Reference to description
AI610	Analog input module	S600
AI620	Analog input module	S600
AI625	Analog input module	S600
AI630	Analog input module	S600
AI635	Analog input module	S600
AO610	Analog output module	S600
AO650	Analog output module	S600
CI532V01	RCOM communication submodule	RCOM AC 110
CI532V02	MODBUS communication submodule	MultiVendor Interface MODBUS AC 110
CI532V03	Siemens 3964R communication submodule	MultiVendor Interface Siemens 3964R AC 110
CI610	Bus extender module for I/O station	S600
CI615	Bus extender module for base station	S600
CI626	AF 100 communication module (coax cable)	S600
CI627	AF 100 communication module (twisted pair)	S600
CI670	MasterFieldbus communication module (slave)	S600
CI671	MasterFieldbus communication module (master)	S600
DI610	Digital input module	S600
DI620	Digital input module	S600

Table 1-3. Hardware components listed in alphabetical order (Continued)

Type	Denomination	Reference to description
DI621	Digital input module	S600
DI622	Digital input module	S600
DI635	Digital input module	S600
DI636	Digital input module	S600
DI650	Digital input module	S600
DI651	Digital input module	S600
DI652	Digital input module	S600
DO610	Digital output module	S600
DO620	Digital output module	S600
DO625	Digital output module	S600
DO630	Digital output module	S600
DP620	Pulse counter module	S600
DSTC 404	Powered terminator for MasterFieldbus SDB	MasterFieldbus
DSTC 406	Passive terminator for MasterFieldbus SDB	MasterFieldbus
DSTC 451	Overvoltage protector for MasterFieldbus	MasterFieldbus
DSTC 452	Modem for MasterFieldbus coax link (LDB)	MasterFieldbus
DSTC 454L	Modem for MasterFieldbus optical link (LDB)	MasterFieldbus
DSTC 456	Multiplexer for redundant MasterFieldbus	MasterFieldbus
PM632	Processor module	AC110
PM633	Processor module	AC110
RB601	Dummy module	S600
RC610	Cable duct	S600
RC620	Fan unit	S600
RF615	Basic subrack	S600
RF620	Extension subrack	S600
SA610	Power supply module	S600
SA161	Power supply	AC110
SA162	Power supply	AC110

Table 1-3. Hardware components listed in alphabetical order (Continued)

Type	Denomination	Reference to description
SA171	Power supply for field devices	AC110
SA172	Power supply for field devices	AC110
SB610	Lithium battery for PM632	AC110
SB611	Battery for PM633	AC110
SC610	Submodule carrier	S600
SX540	Power switch and distribution unit	AC110
SX542	Power distribution unit	AC110
SX554	Distribution unit 60 V d.c.	AC110
TC610	Terminator for bus extension	S600
TC630	Modem for Advant Fieldbus 100 optical link	Advant Fieldbus 100
TC670	Passive terminator for MasterFieldbus SDB	S600
TF620	Front connector for I/O modules	S600
TK610	Bus extension cable	S600
TK612	Bus cable	S600
TK615	Station voltage cable	S600
TK630	Process cable with front connector	S600
TK640	Screened process cable with front connector	S600

1.6.3 Data Sheets for Hardware Components

The informations about the S600 I/O hardware components are represented as data sheets.

For each component, there is one data sheet containing detailed informations about that component.

In chapter 3 you will find data sheets of all components of the S600 I/O. They are listed in alphabetical order.

1.6.4 Contents of Data Sheets

In general, the data sheet of a S600 I/O hardware component contains the following informations:

- Heading
- Summary
- Associated data base elements
- Technical data
- Front view
- Process connections
- Functional description

Heading

In the heading of the data sheet, the type of the hardware component is given, for example AI610.

Summary

The summary provides a brief description of the hardware component.

Associated data base elements

This part informs, which (if any) data base elements are associated to the hardware component.

Technical data

The technical data of the hardware component are given in a table.

Front view

A drawing of the hardware component.

Process connections

Here you find examples of how to connect the I/O module to the process. If the hardware component isn‘t an I/O module, the example explains how to connect it to other components.

Functional description

The functional description gives detailed information about the hardware component and its functions.

Chapter 2 Installation and Maintenace

2.1 Safety regulations

Always follow the instructions below when installing and operating an Advant Controller system to minimize the risks of injury to personnel and damage to the equipment. Local statutory regulations, to the degree that they are stricter than the following instructions, take precedence.

2.1.1 Personnel and Process Safety

DANGER - CAUTION

Observe the following:

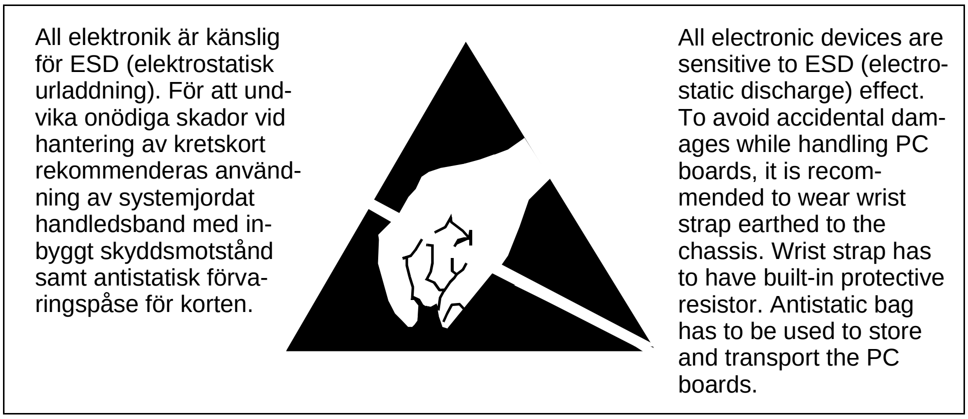
- Use only approved hoisting equipment when lifting cabinets. See lifting instructions enclosed with the cabinet.
- Never switch on the voltage supply of the cabinet during installation work.
- **Work with care when supply voltage is applied in the system. The voltage in the cabinet can cause injury and can even kill a human being.**
- Make sure that everyone working on the installation knows the location of the safety switch and the main power supply switch to the Advant Controller 110 equipment and how to use it.
- When the subsections of the process are checked and a test run has been performed, a responsible person is to check out interlocking chains, etc.
  Inform all assembly personnel about test runs to be performed.
- Process technicians are to be present when testing and operating the process objects.
- Never press the system INIT (initialization) button if you do not know what happens in the system with an initialization.
- Remember that the control system can be controlled from an engineering station connected at another node via AF 100. For example it can be stopped, configured and started remotely.
- Remember that an Advant Controller 110 starts automatically when voltage is applied if this is not prevented by setting the START MODE selector in the STOP position.

2.1.2 Machine Safety

CAUTION

Observe the following safety rules:

- Avoid discharges of static electricity by grounding both yourself and tools before handling circuit boards and other parts of the equipment.
- Use the grounded wristband installed in the cabinet and the available folding working surface (service shelf) when handling parts of the system.
- Handle the circuit boards carefully, particularly those which contain MOS components which can be damaged by static electricity discharges. Note the warning label on the circuit boards.
- Use, as far as possible, the grounded wristband when handling boards not stored in envelopes of conductive plastic. This gives optimum protection against static electricity discharges.
- Always store circuit boards in envelopes of conductive plastic when not installed in the system rack.
- Always switch off the voltage before extracting a board which cannot be exchanged while under voltage. Wait a sufficient time for the capacitors to discharge.
- Switch off voltage to the system and withdraw all boards at least 20 mm before electrical welding is performed near the controller system.
- A warning label is fixed in the system to draw attention to possible damage by ESD (Electro Static Discharge).



All elektronik är känslig för ESD (elektrostatisk urladdning). För att undvika onödiga skador vid hantering av kretskort rekommenderas användning av systemjordat handledsband med inbyggt skyddsmotstånd samt antistatisk förvaringspåse för korten.

All electronic devices are sensitive to ESD (electrostatic discharge) effect. To avoid accidental damages while handling PC boards, it is recommended to wear wrist strap earthed to the chassis. Wrist strap has to have built-in protective resistor. Antistatic bag has to be used to store and transport the PC boards.

Figure 2-1. Warning Label regarding ESD

2.2 Visual inspection

Inspect the Advant Controller 110 system at intervals which depend on environmental factors such as vibration, air pollution and temperature.

2.2.1 Safety

Check that all screwed connections are properly tightened. Ensure that wiring, modules and other electrical components are undamaged. Pay particular attention to signs of overheating, damaged isolation or wear.

2.2.2 Cleanliness

Remove dust, etc., from the cabinet with compressed air or a vacuum cleaner. Use a lint-free cloth dampened with methylated spirits to remove stubborn dirt.

2.2.3 Air filter

If an air filter is included in the equipment, wash it in warm water with a mild detergent at intervals determined by the prevailing environmental conditions. Replace the filter after it has been washed three times. The new filter must be an approved spare.

2.2.4 Forced cooling

If a fan is fitted, check its operation, too.

2.3 Module replacement

2.3.1 General

User support for maintenance (and especially for module replacement) has been designed into the Advant Controller 110. The system supports you to replace or insert a module during operation.

The system has the following important built-in hardware and software measures designed to cope with the special situation of module replacement:

- When the process connector is removed, the system registers this, error signals are set on DB elements and updating of the “VALUES” is discontinued. Operation of the module is inhibited (the green LED RUN extinguishes) and the outputs are switched off.
- Precautions have been taken (e.g., leading ground pins on the bus connectors, etc.) to ensure that whenever a module is withdrawn or inserted, the rest of the system is not disturbed.
- Before an exchanged module can go into operation again, the process connector must be inserted and the diagnostic checks must all be satisfactory. The diagnostic checks include type of module and position (slot).

WARNING

Before replacing a module in a running system, it is important that you examine the consequences. Process equipment may be damaged if critical signals are not updated.

For this reason, it is essential that you know which signals are affected. For example:

- The replacement of an I/O module affects all channels on the module
- The replacement of a bus extender (e.g., CI610) affects the whole I/O station.

Fully consider and understand the consequences before taking any action.

2.3.2 Replacement of an I/O module

The system software in the Advant Controller 110 automatically checks that all I/O modules are operating correctly. In the event of a defective or missing module (e.g., during replacement), the module and associated signals are flagged at the “ERR” terminal of the data base elements. The signal value (VALUE) is not updated as long as the error persists.

The I/O module runs a self-testing routine following power-up and during operation. Providing no serious defect is detected, the red LED (FAULT) extinguishes. The system software checks that:

- The module is in the correct position (position)
- The module is of the right type
- The module is not defective
- The process connector is in place.

If all these points are in order, the green LED (RUN) lights up, the error flag on the data base element is reset and the module switches to the operating mode.

Before replacing output modules (analog or digital), it is advisable to isolate the output signals from the process.

Follow this procedure to replace a faulty or suspect I/O module:

- Read Section 2.1.1, Personnel and Process Safety.
- Open the front door of the module. Remove the paper strip (with the signal names) inside the front door to use again with the new module.
- Release the screw securing the process connector (about 15 turns) until it turns freely. If the module is in operation, it registers that the connector has been removed and stops operating (green LED RUN extinguishes).
- Remove the process connector.
- Release the screw securing the module (about 15 turns) until it turns freely and withdraw the module.
- Check that the new module is the same type as the old one.
- Insert the new module. Ensure that it is fully in place up to the hinge of the backplane. Tighten the module-securing screw. If the module is working correctly, the red LED (FAULT) lights briefly and then extinguishes.
- Insert the process connector and tighten the connector screw. The new module is taken into operation automatically and the green LED (RUN) lights up.
- Exchange the paper strip and close the front door.

Chapter 3 Data sheets

3.1 AI610

Summary

The analog input module AI610 converts analog input signals from transmitters to digital values required by the programmable controller. It has 32 single-ended, non-isolated channels for 0 to 20 mA.

Associated data base element

Associated data base elements are AI610 for the module and AIS610 for its input channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-1. AI610 Technical data

Analog Input	AI610
No. of inputs	32
Type of input	single-ended
Measurement range	0 to 20 mA
Overrange	> 21 mA
Live zero error	--
Isolation	no
Input resistance	250 Ohms
Common mode voltage CMRR	- -

Table 3-1. AI610 Technical data (Continued)

Analog Input	**AI610**
Analog input error(1) - Max error at 25°C - Temp. coefficient	 0.2 % 0.01 %/°C
Resolution	12 bits
Filter - Low-pass, cutoff frequency - Mains frequency suppression at 50, 60 Hz	 14 Hz 50 dB
Conversion time - for all channels	 <= 60 ms
Current consumption (from USA/USB) - typical - maximum	 100 mA 120 mA
Power dissipation - typical(2) - maximum(3)	 2.3 W 5.4 W
Weight	1.15 kg

(1) For technical data valid in conjunction with the type approvals mentioned below refer to Advant Marine System 110 User's Guide, document no. 3BNP00206R0101, Chapter 1, Table 1-1.
- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Lloyd's Register of Shipping (LRS)
- Nippon Kaije Kyokai (NK)
- Registro Italiano Navale (RINA)

(2) At rated supply voltage, all inputs loaded at 50 %

(3) At max. supply voltage, all inputs loaded at 100 %

Front view

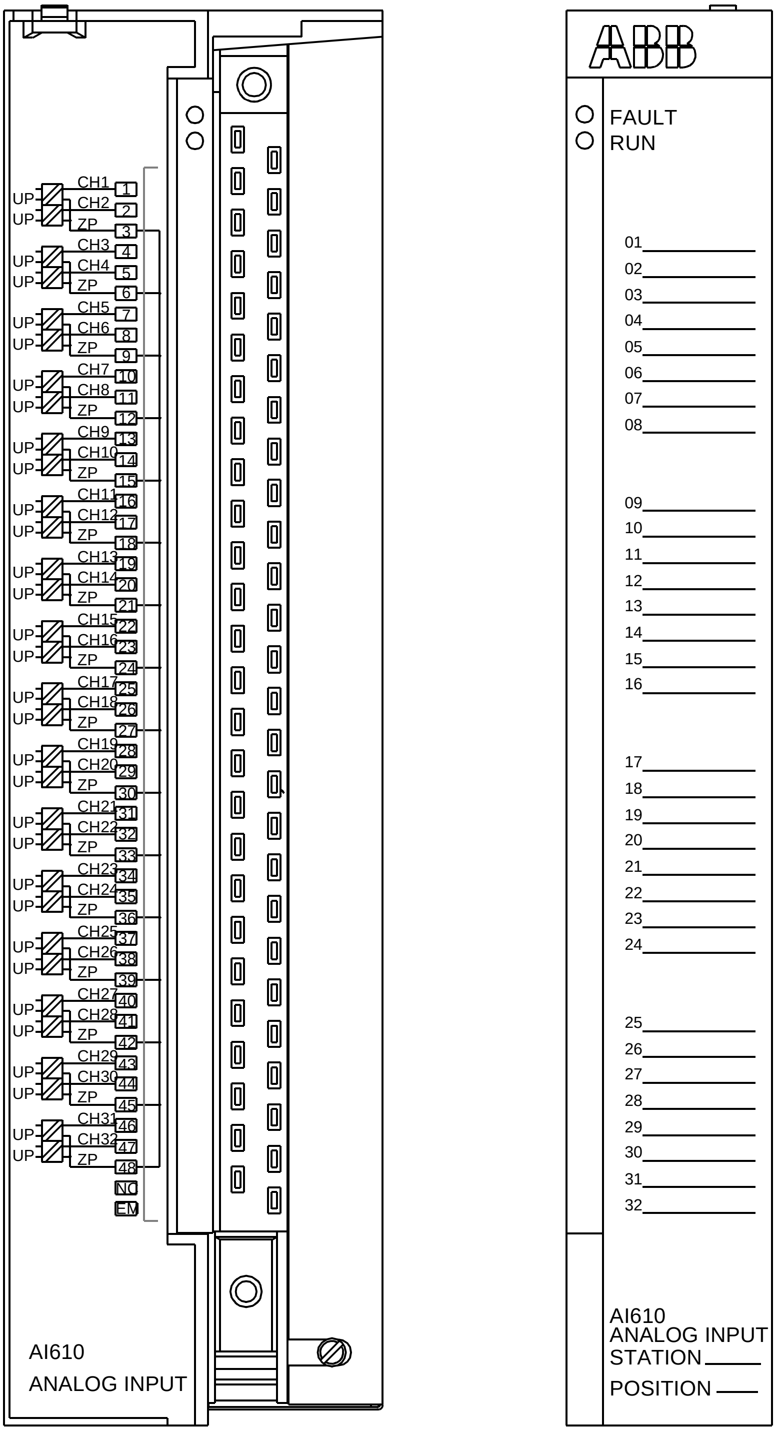


Figure 3-1. AI610 Front view

Process connections

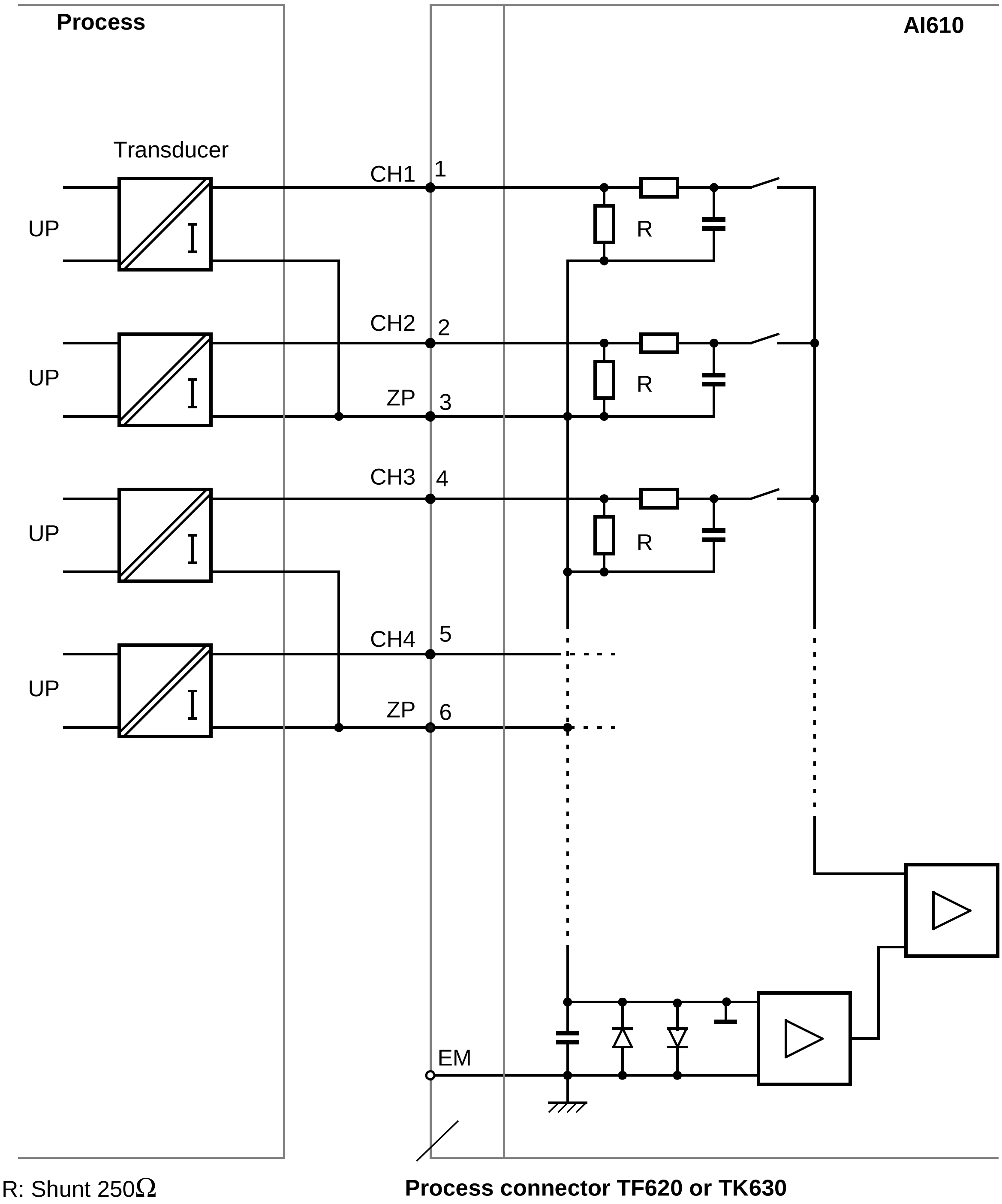


Figure 3-2. AI610 Process connections

Functional description

The analog input module AI610 has 32 single-ended, non-isolated input channels for 0 to 20 mA. It converts the analog input signals from transmitters to digital values required by the programmable controller.

The module is equipped with an internal processor and analog multiplexers. The input signals pass through analog and digital filters. Under program control, the multiplexer connects one measurement channel at a time to the A/D converter. If a severe fault is detected, the LED (FAULT) on the front of the module lights and the internal input signals are set to “0.”

There are two LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

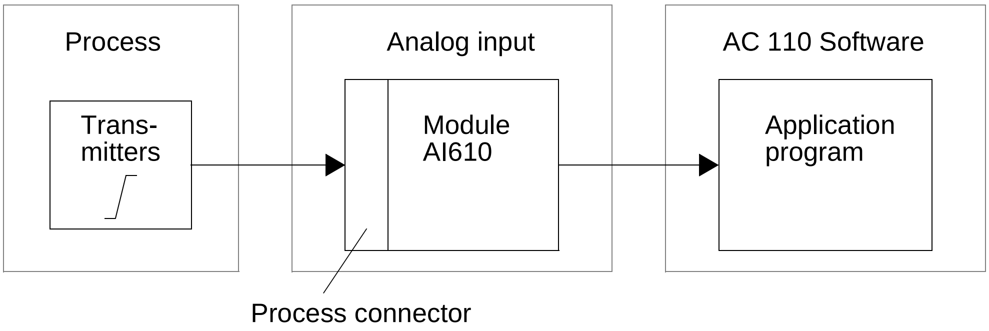


Figure 3-3. AI610 Block diagram

The hardware and software signal processing in the input module AI610 involves the following procedures:

Filtering and A/D conversion

- Prefiltering and gain control
- Conversion of analog signals to digital signals
- Digital filtering.
- Signal overrange supervision

The following diagram shows how standard current signals are processed.

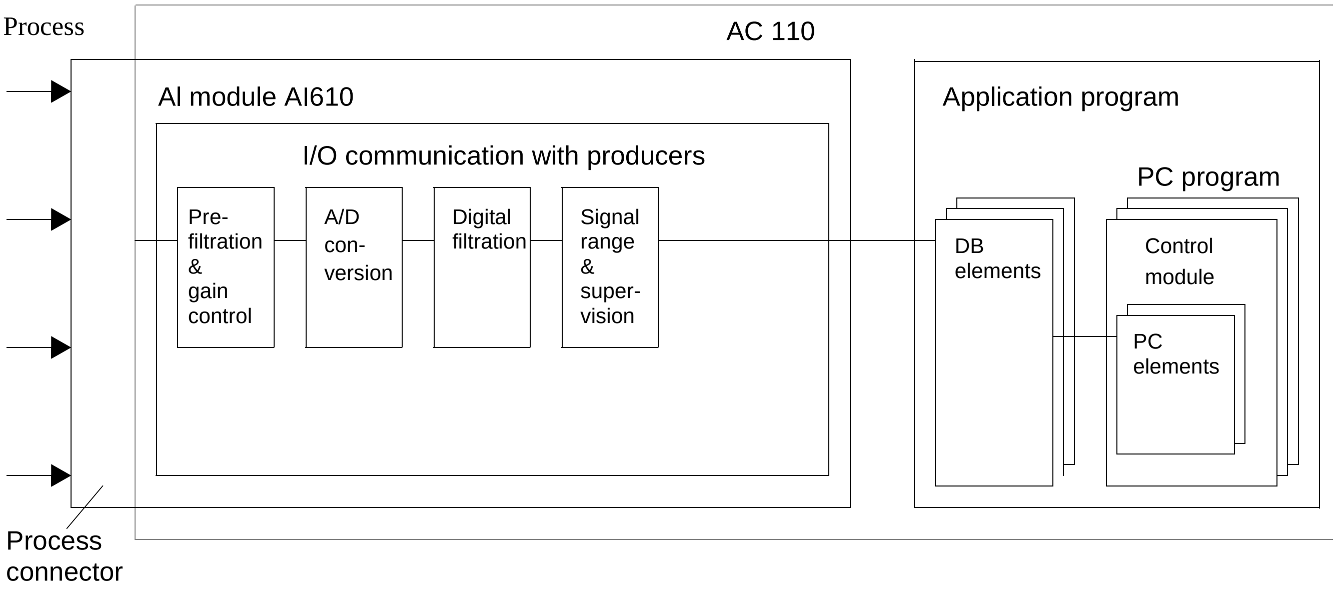


Figure 3-4. Processing of analog input signals

Filtering and A/D conversion

The input signals pass through an analog lowpass filter to remove high-frequency interference.

Filtered signals are transferred by an analog multiplexer to an instrument amplifier and conditioned for the A/D conversion.

After A/D conversion, the signals are filtered a second time by a digital filter to suppress the mains frequency interference.

Signal overrange supervision

Excursions of the input signal outside its permissible range, i.e., input signals five percent greater than the normal input range, are indicated as an error in the data base elements. In that case, values are represented by „NAN“ (Not a Number).

3.2 AI620

Summary

The analog input module AI620 converts analog input signals from transmitters to digital values required by the programmable controller. It has 16 differential channels for 0 to 20 mA, 4 to 20 mA, -20 to +20 mA or -10 to +10 V.

Associated data base element

Associated data base elements are AI620 for the module and AIS620 for its input channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-2. AI620 Technical data

Analog Input	AI620
No. of inputs	16
Type of input	differential, resistor network „high CMV“
Measurement range	0 to 20 mA 4 to 20 mA -20 to +20 mA -10 to +10V
Overrange	<-1 mA; >20.3 mA <-3.2 mA; >20.3 mA <-21 mA; >20.3 mA <-10.5 V; >10.5 V
Live zero error	< 2 mA
Isolation	no
Input resistance	
- Current input	250 Ohms
- Voltage input	500 kOhms
Common mode voltage (between channels)	100 V
CMRR	80 dB

Table 3-2. AI620 Technical data (Continued)

Analog Input	AI620
Analog input error(1) - Max error at 25°C - Temp. coefficient	 0.2 % 0.01 %/°C
Resolution	12 bits
Filter - Low-pass, cutoff frequ. - Mains frequ. suppression at 16 2/3, 50, 60 Hz	 10 Hz 50 dB
Conversion time - for all channels	 <= 40 ms
Current consumption (from USA/USB) - typical - maximum	 200 mA 280 mA
Power dissipation - typical(2) - maximum(3)	 5.2 W 7.8 W
Weight	1.15 kg

(1) For technical data valid in conjunction with the type approvals mentioned below refer to Advant Marine System 110 User’s Guide, document no. 3BNP00206R0101, Chapter 1, Table 1-1.
- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Lloyd’s Register of Shipping (LRS)
- Nippon Kaije Kyokai (NK)
- Registro Italiano Navale (RINA)

(2) At rated supply voltage, all inputs loaded at 50 %

(3) At max. supply voltage, all inputs loaded at 100 %

Front view

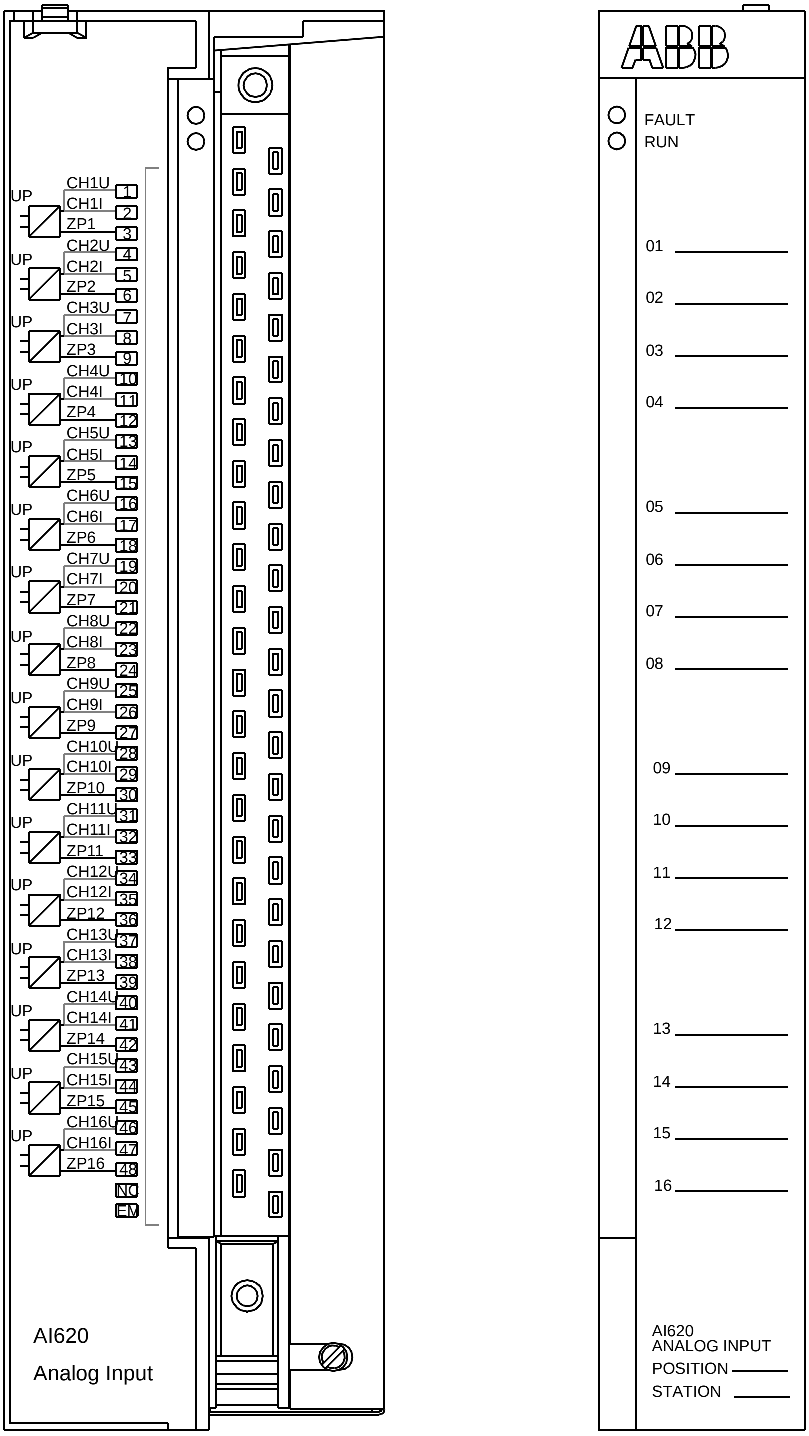
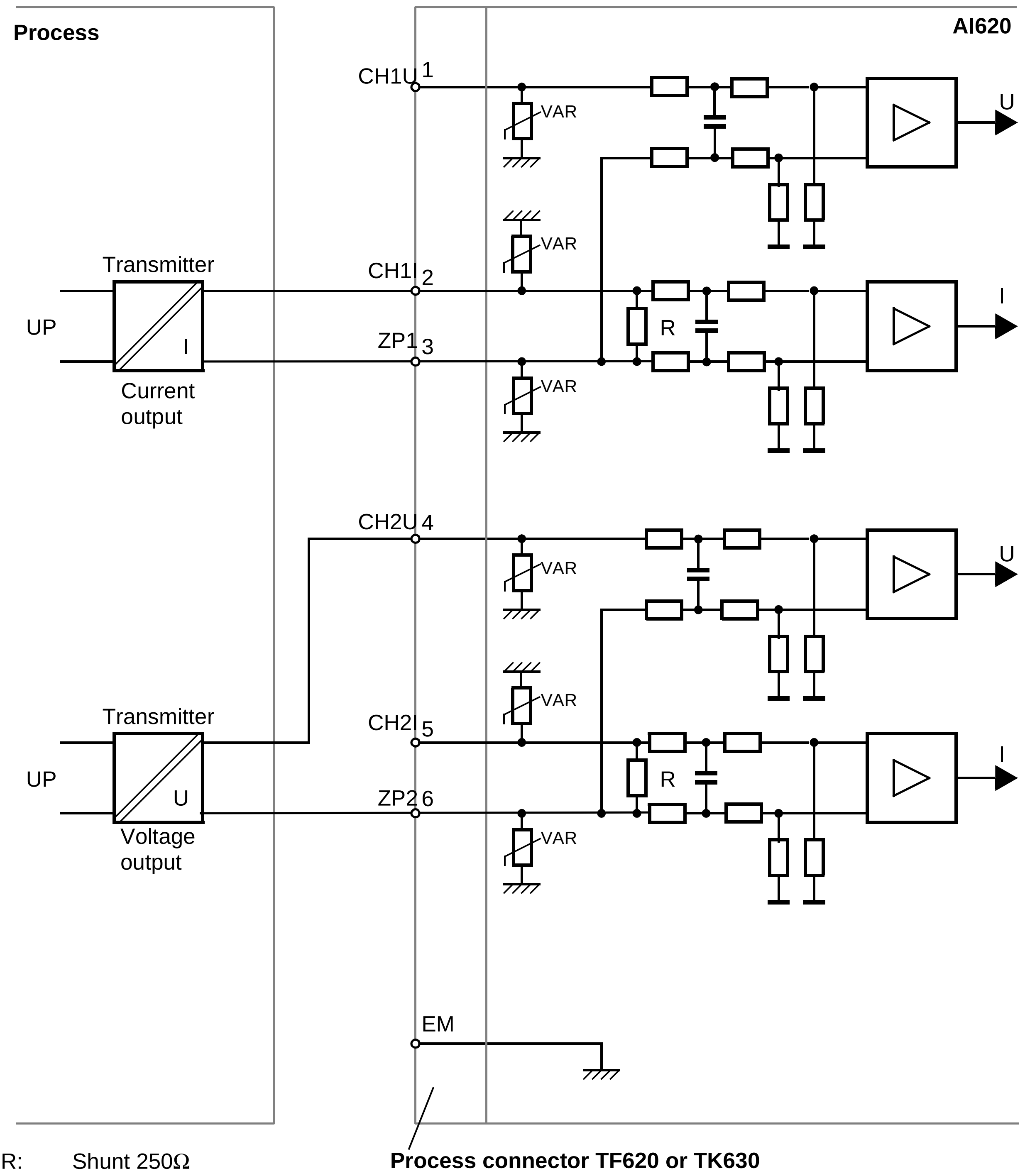


Figure 3-5. AI620 Front view

Process connections



R: Shunt 250Ω
VAR: Metal oxide varistor

Figure 3-6. AI620 Process connections

Functional description

The analog input module AI620 has 16 differential input channels for 0 to 20 mA, 4 to 20 mA, -20 to +20 mA or -10 to +10 V. The input channels are not isolated, but have a resistor network allowing a common mode voltage of up to 100 V. The module converts the analog input signals from transmitters to digital values required by the programmable controller.

The module is equipped with an internal processor and analog multiplexers. The input signals pass through analog and digital filters. Interference suppression and signal filtering and offset and gain correction are performed either individually or together for all channels. Under program control, the multiplexer connects one measurement channel at a time to the A/D converter. If a severe fault is detected, the LED (FAULT) on the front of the module lights and the internal input signals are set to “0.”

There are two LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

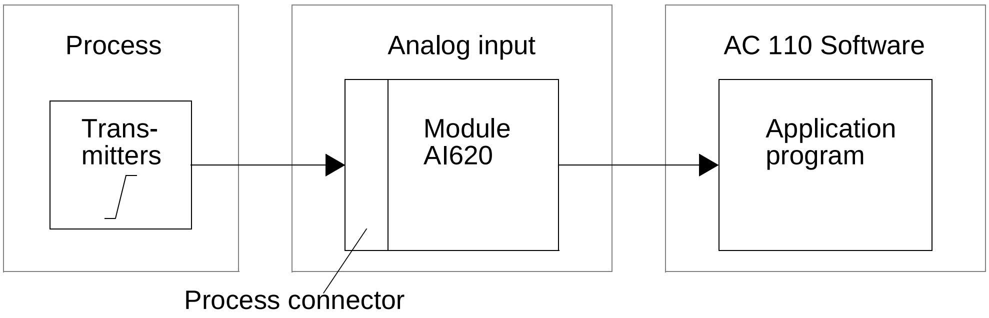


Figure 3-7. AI620 Block diagram

The hardware and software signal processing in the input module AI620 involves the following procedures:

Filtering and A/D conversion

- Prefiltering and gain control
- Conversion of analog signals to digital signals
- Digital filtering.

Signal range and supervision

- Signal range
- Overrange and live zero supervision
- Limit check with hysteresis.

The following diagram shows how current and voltage signals are processed.

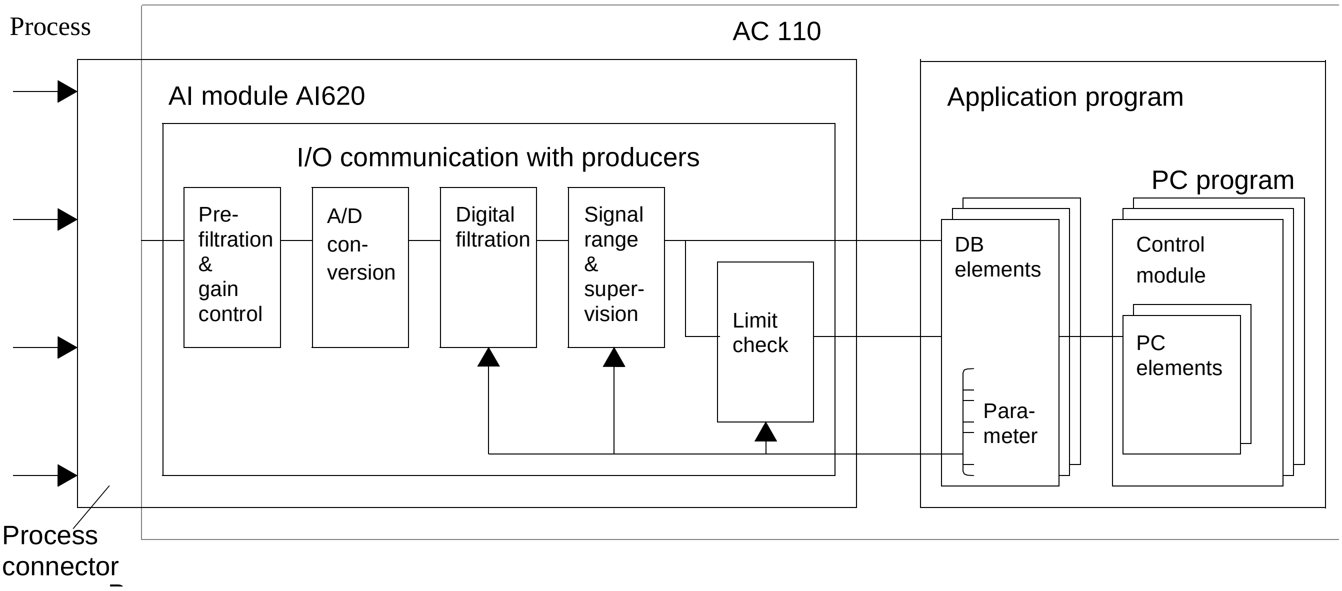


Figure 3-8. Processing of analog input signals

Filtering and A/D conversion

The input signals pass through an analog lowpass filter to remove high-frequency interference.

Filtered signals are transferred by an analog multiplexer to an instrument amplifier and conditioned for the A/D conversion.

After A/D conversion, the signals are filtered a second time by a digital filter to suppress the mains frequency interference.

Signal range and supervision

Excursions of the input signal outside its permissible range, i.e., input signals five percent greater than the normal input range, are indicated as an error in the data base elements. In that case, values are represented by „NAN“ (Not a Number).

If the measurement range is 4 to 20 mA, the AI620 checks the live zero signal, too.

Data base element parameters

In the database element AI620, you can select the mains frequency to be supressed.

In the database elements AIS620, you can set the following parameters individually for each input channel:

- Channel active (on or off)
- Conversion parameter (signal range)
- Two low-limit values
- Two high-limit values
- One hysteresis.

You can select whether the signal shall be active or not. If the signal is designated inactive, the value for the corresponding channel in the data base element is not updated.

The limit check can supervise four limits, two low and two high. The limits have a hysteresis which is always within the limit (see figure below). Limit values and hysteresis are determined by parameters in the data base elements. The unit of limits and hysteresis differ depending on the type of analog input module: for AI620, values are specified in a percentage.

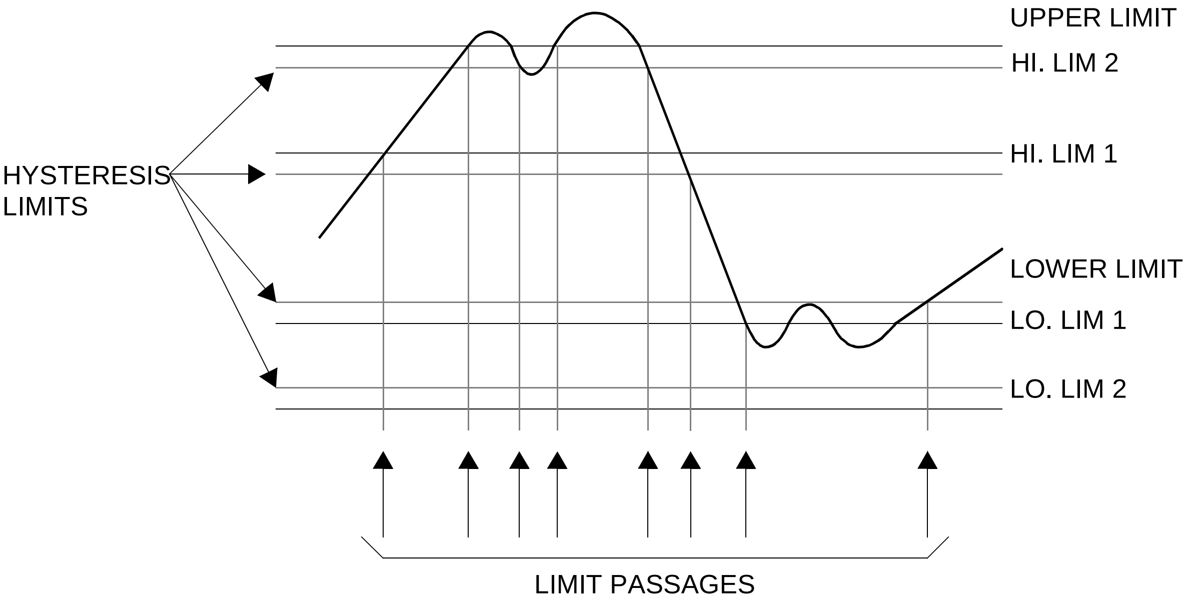


Figure 3-9. Limit check with hysteresis

The data base elements also contain information (signals) identifying which limits have been exceeded. This information (signals) is accessible for PC elements.

3.3 AI625

Summary

The analog input module AI625 converts analog input signals from transmitters to digital values required by the programmable controller. It has 16 single-ended channels for 4 to 20 mA. All inputs and their transmitter supply are isolated from the electronic power, but there is no channel-to-channel isolation.

Associated data base elements

Associated data base elements are AI625 for the module and AIS625 for its input channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-3. AI625 Technical data

Analog Input	AI625
No. of inputs	16
Type of input	single-ended
Measurement range	4 to 20 mA
Overrange	<2.0 mA; >22.4 mA
Live zero error	< 2 mA
Isolation - in groups per - test voltage	yes, 16 500 V rms
Input resistance	100 Ohms
Common mode voltage CMRR	- -

Table 3-3. AI625 Technical data (Continued)

Analog Input	**AI625**
Analog input error(1) - Max error at 25°C - Temp. coefficient	 0.2 % 0.005 %/°C
Resolution	12 bits
Filter - Low-pass, cutoff frequency - Mains frequency suppression at 16 2/3, 50, 60 Hz	 16 Hz 70 dB
Conversion time - for all channels	 < 20 ms
Current consumption (from USA/USB) - typical - maximum	 400 mA 800 mA
Power dissipation - typical(2) - maximum(3)	 3.5 W 6.5 W
Weight	1.15 kg

(1) For technical data valid in conjunction with the type approvals mentioned below refer to Advant Marine System 110 User’s Guide, document no. 3BNP00206R0101, Chapter 1, Table 1-1.
- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Lloyd’s Register of Shipping (LRS)
- Nippon Kaije Kyokai (NK)
- Registro Italiano Navale (RINA)

(2) At rated supply voltage, all inputs loaded at 50 %

(3) At max. supply voltage, all inputs loaded at 100 %

Front view

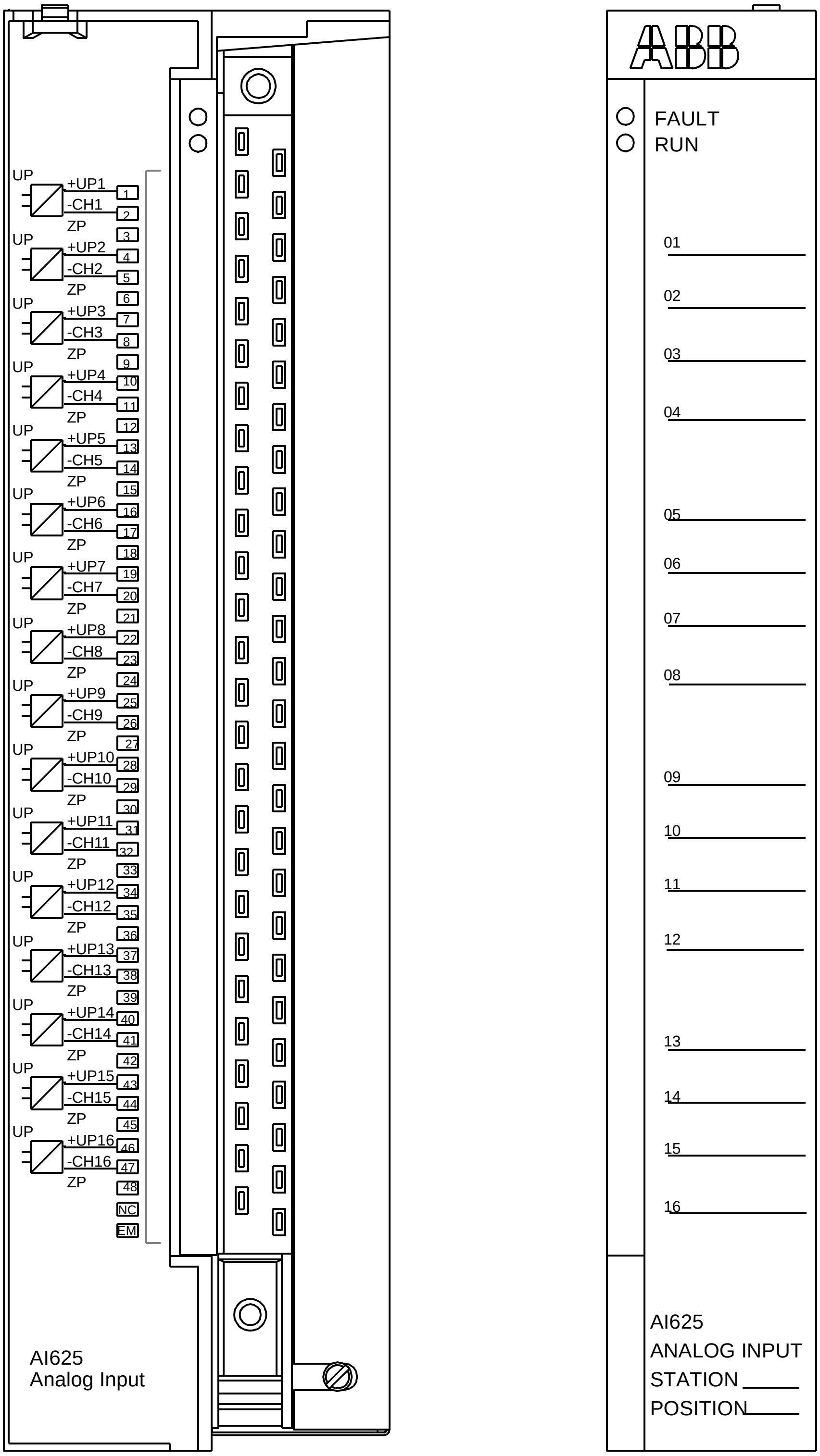


Figure 3-10. AI625 Front view

Process connections

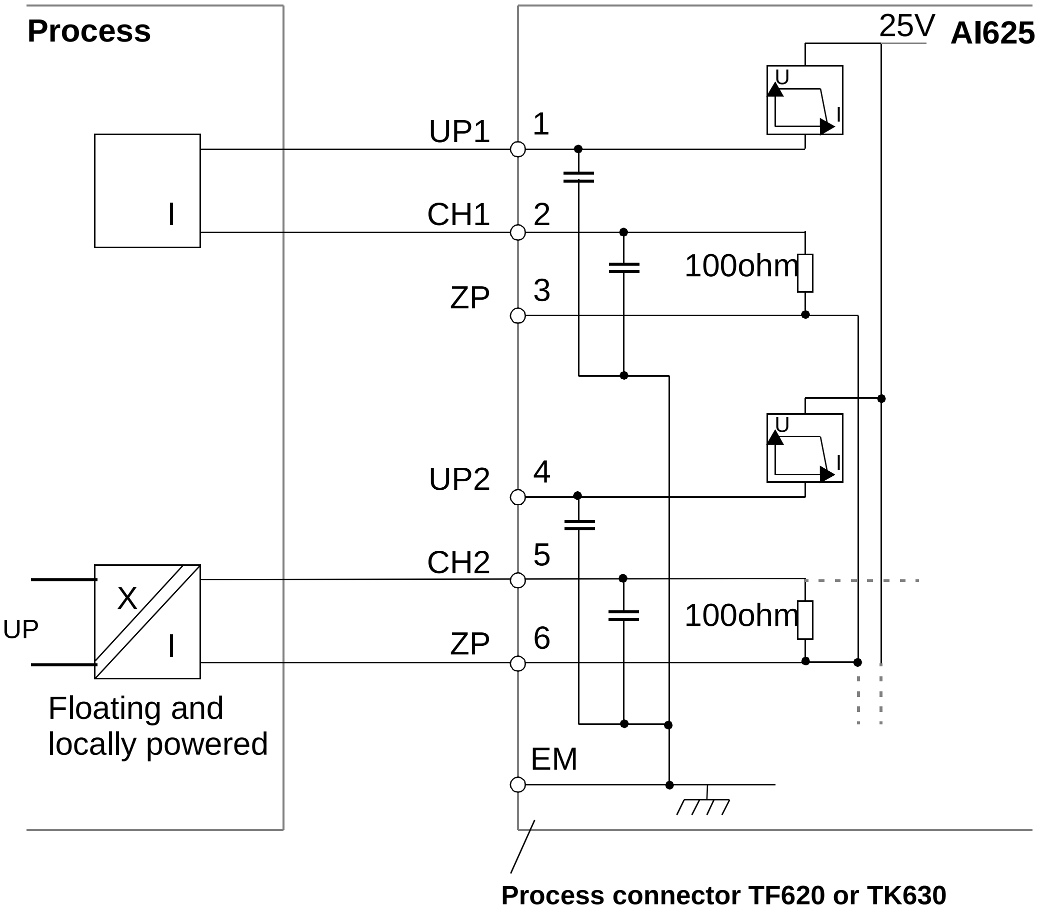


Figure 3-11. AI625 Process connections

Functional description

The analog input module AI625 has 16 single-ended input channels for 4 to 20 mA. The module converts the analog input signals from transmitters to digital values required by the programmable controller. The input channels and their transmitter supply are isolated from the electronic power, but they are not isolated from each other (no channel-to-channel isolation). The transmitter supply is provided by the analog input module.

The module is equipped with an internal processor and analog multiplexers. The input signals pass through analog and digital filters. Interference suppression and signal filtering and offset and gain correction are performed either individually or together for all channels. Under program control, the multiplexer connects one measurement channel at a time to the A/D converter. If a severe fault is detected, the LED (FAULT) on the front of the module lights and the internal input signals are set to “0”.

There are two LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

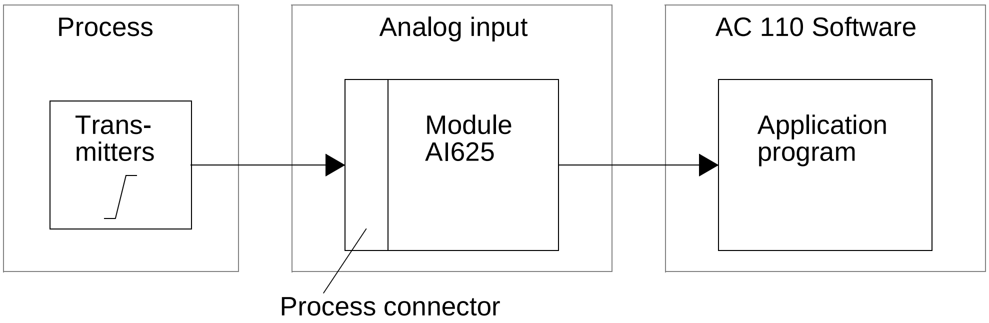


Figure 3-12. AI625 Block diagram

The hardware and software signal processing in the input module AI625 involves the following procedures:

Filtering and A/D conversion

- Prefiltering and gain control
- Conversion of analog signals to digital signals
- Digital filtering.

Signal range and supervision

- Signal range
- Overrange and live zero supervision
- Limit check with hysteresis.

The following diagram shows how current signals are processed.

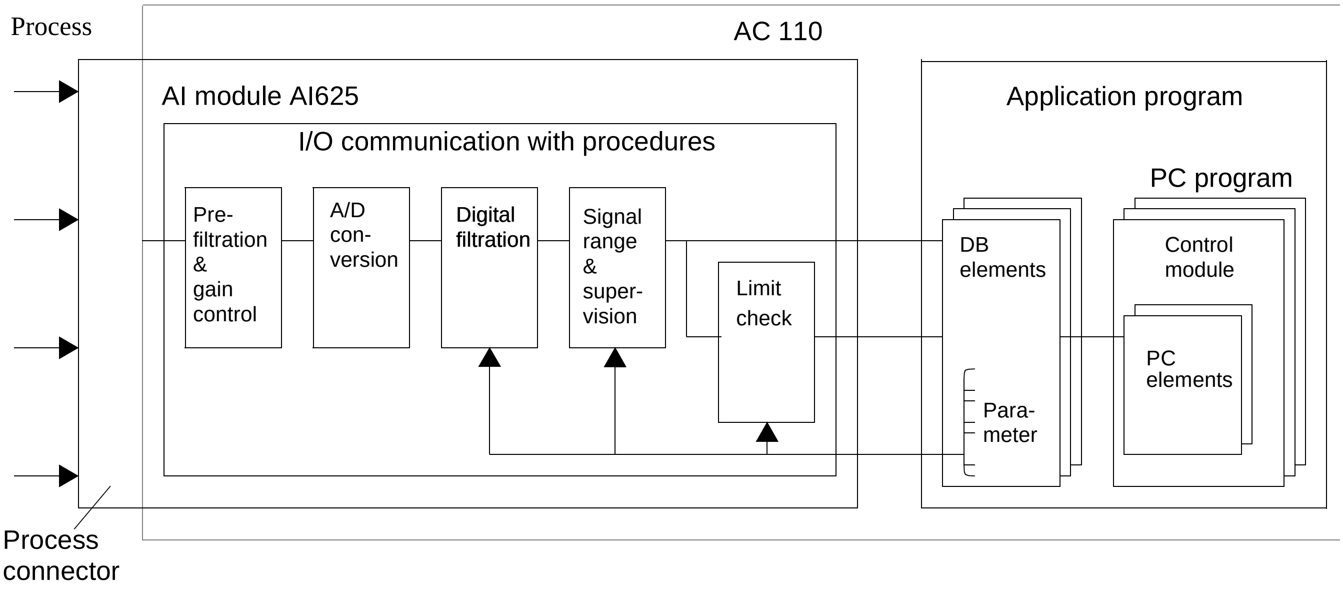


Figure 3-13. Processing of analog input signals

Filtering and A/D conversion

The input signals pass through an analog lowpass filter to remove high-frequency interference.

Filtered signals are transferred by an analog multiplexer to an instrument amplifier and conditioned for the A/D conversion.

After A/D conversion, the signals are filtered a second time by a digital filter to suppress the mains frequency interference.

Signal range and supervision

Excursions of the input signal outside its permissible range, i.e., input signals five percent greater than the normal input range, are indicated as an error in the data base elements. In that case, values are represented by „NAN“ (Not a Number).

The AI625 checks the inputs signals for live zero, too.

Data base element parameters

In the database element AI625 you can select the mains frequency to be suppressed.

In the database elements AIS625, you can set the following parameters individually for each input channel:

- Channel active (on or off)
- Two low-limit values
- Two high-limit values
- One hysteresis.

You can select whether the signal shall be active or not. If the signal is designated inactive, the value for the corresponding channel in the data base element is not updated.

The limit check can supervise four limits, two low and two high. The limits have a hysteresis which is always within the limit (see figure below). Limit values and hysteresis are determined by parameters in the data base elements. The unit of limits and hysteresis differ depending on the type of analog input module: for AI625, values are specified in a percentage.

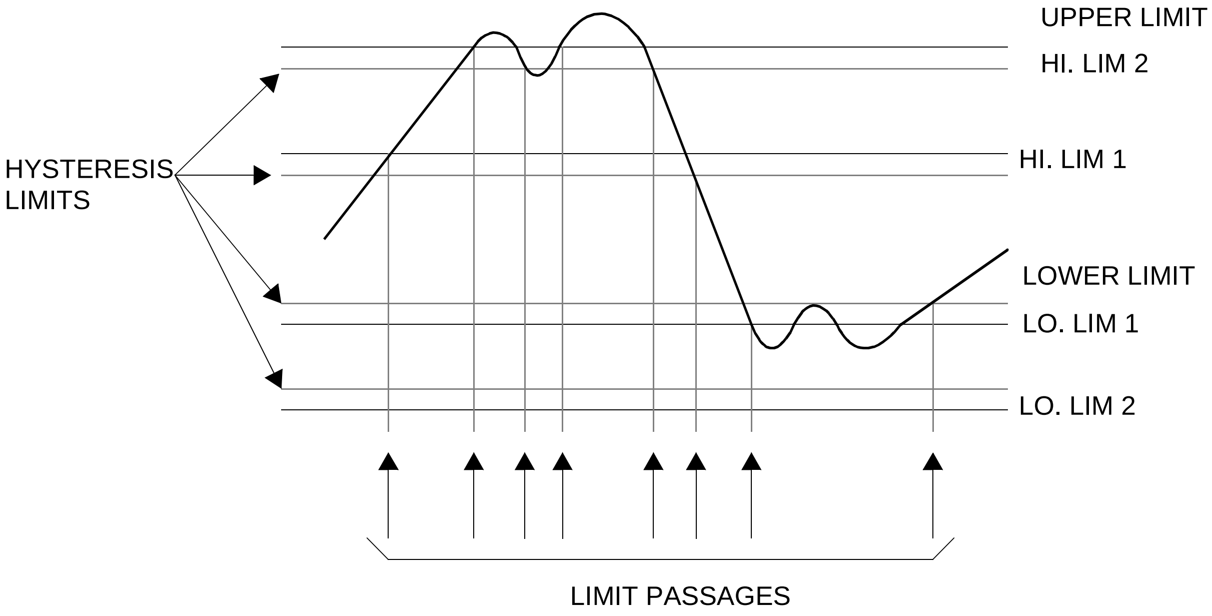


Figure 3-14. Limit check with hysteresis

The data base elements also contain information (signals) identifying which limits have been exceeded. This information (signals) is accessible for PC elements.

3.4 AI630

Summary

The analog input module AI630 converts analog input signals from Pt100 temperature transmitters or from resistance transmitters to digital values required by the programmable controller. It has 12 channels for three- or four-wire connection of the transmitters. All inputs and their transmitter supply are isolated from the electronic power, but there is no channel-to-channel isolation.

Associated data base elements

Associated data base elements are AI630 for the module and AIS630 for its input channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-4. AI630 Technical data

Analog Input	AI630
No. of inputs	12
Type of input	Pt100 or Resistor 3- or 4-wire
Measurement range	-200 to +600°C or 0 to 500 Ohms
Overrange	<-230; >630°C or <0; >525 Ohms
Live zero error	-
Isolation - in groups per - test voltage	yes, 12 500 V rms
Input resistance	$\geq$1 MOhm
Common mode voltage CMRR	0.5 V(1) 100 dB
Max. differential input voltage	-

Table 3-4. AI630 Technical data (Continued)

Analog Input	**AI630**
Analog input error - Max error at 25°C - Temp. coefficient	 0.05 % 0.005 %/°C
Resolution	13 bits
Filter - Low-pass, cutoff frequency - Mains frequency suppression at 16 2/3, 50, 60 Hz	 300 Hz 60 dB
Conversion time - per channel	 < 100 ms
Measurement cycle time - for all channels	 <1.6 sec
Current consumption (from USA/USB) - typical - maximum	 90 mA 165 mA
Power dissipation - typical(2) - maximum(3)	 2.2 W 4 W
Weight	1.15 kg

(1) Between channels
(2) At rated supply voltage, all inputs loaded at 50 %
(3) At max. supply voltage, all inputs loaded at 100 %

Front view

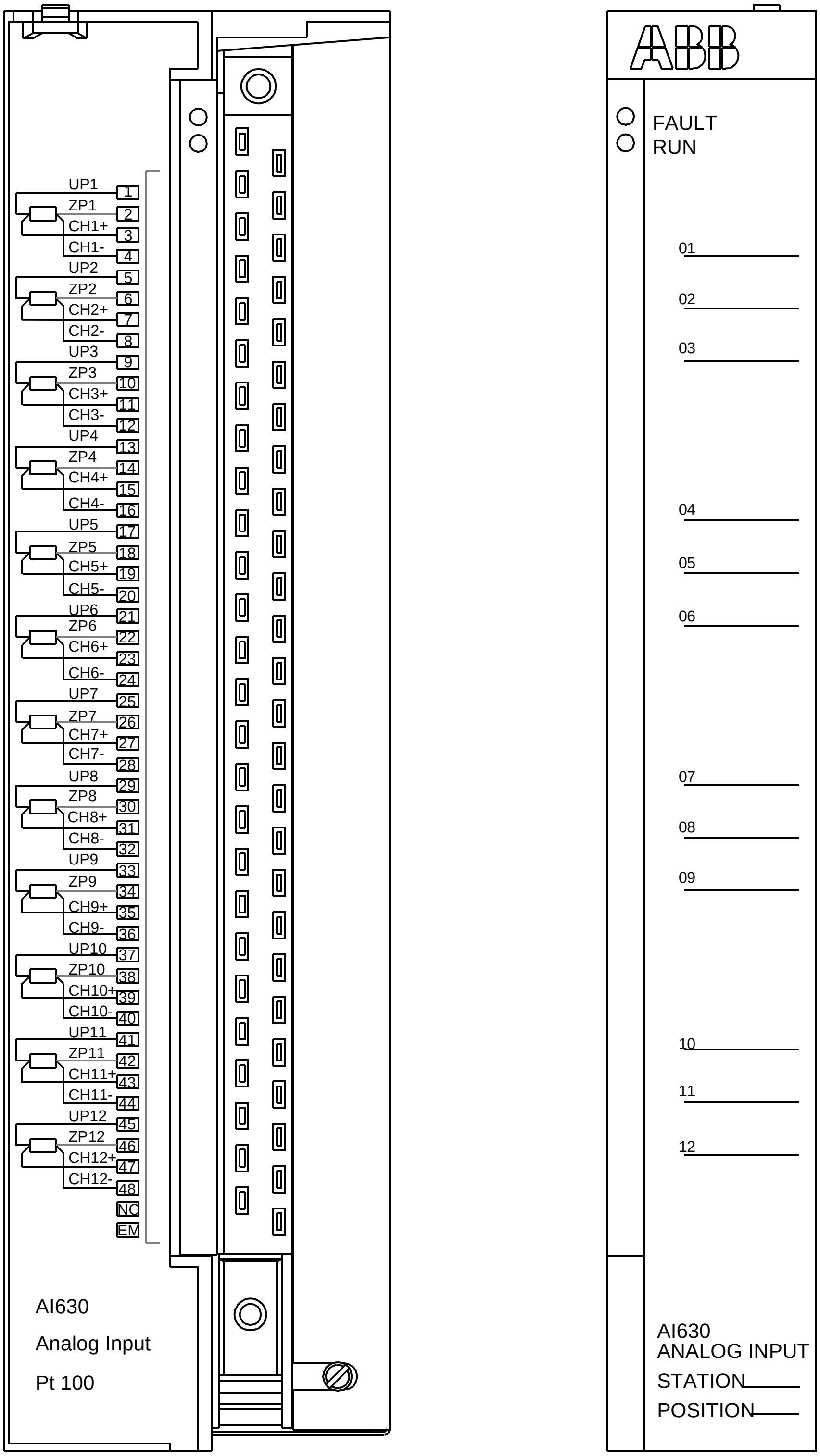


Figure 3-15. AI630 Front view

Process connections

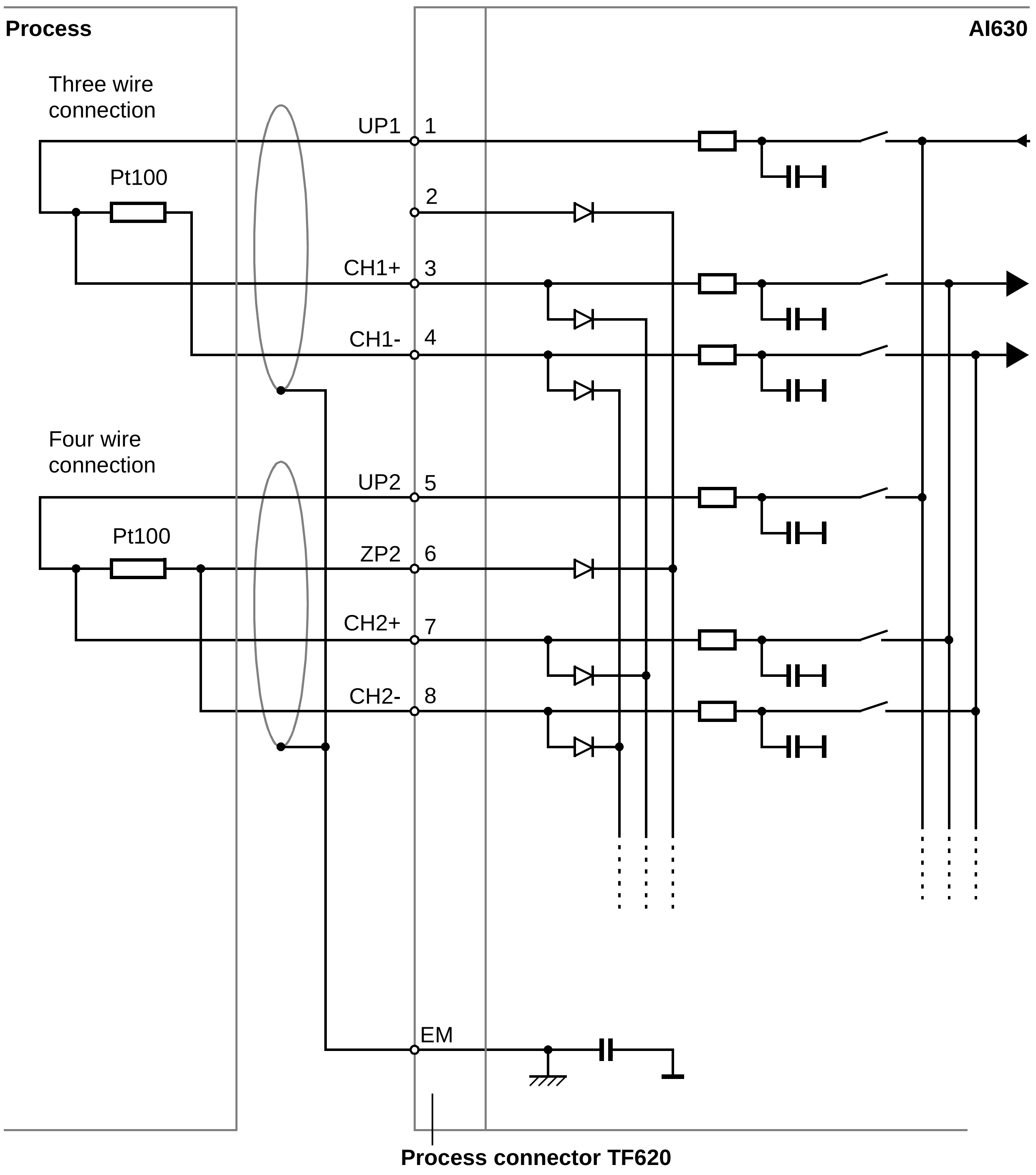


Figure 3-16. AI630 Process connections

Functional description

The analog input module AI630 has 12 input channels for Pt100 temperature transmitters or for resistance transmitters. The transmitters can be connected with either three or four wires. The module converts the analog input signals from the transmitters to digital values required by the programmable controller. The input channels and their transmitter supply are isolated from the electronic power, but they are not isolated from each other (no channel-to-channel isolation). The transmitter supply (2 mA for each transmitter) is provided by the analog input module.

The module is equipped with an internal processor and analog multiplexers. The input signals pass through analog and digital filters. Interference suppression and signal filtering and offset and gain correction are performed either individually or together for all channels. Under program control, the multiplexer connects one measurement channel at a time to the A/D converter. If a severe fault is detected, the LED (FAULT) on the front of the module lights and the internal input signals are set to “0”.

There are two LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

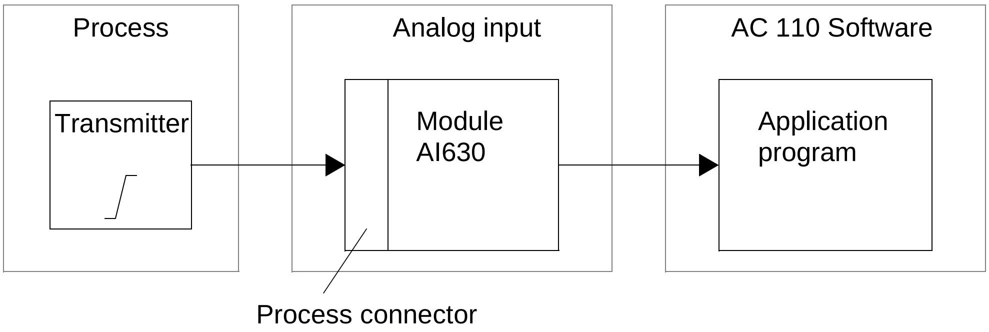


Figure 3-17. AI630 Block diagram

The hardware and software signal processing in the input module AI630 involves the following procedures:

Filtering and A/D conversion

- Prefiltering and gain control
- Conversion of analog signals to digital signals
- Digital filtering.

Signal range and supervision

- Signal range
- Overrange and live zero supervision
- Limit check with hysteresis.

The following diagram shows how analog signals are processed.

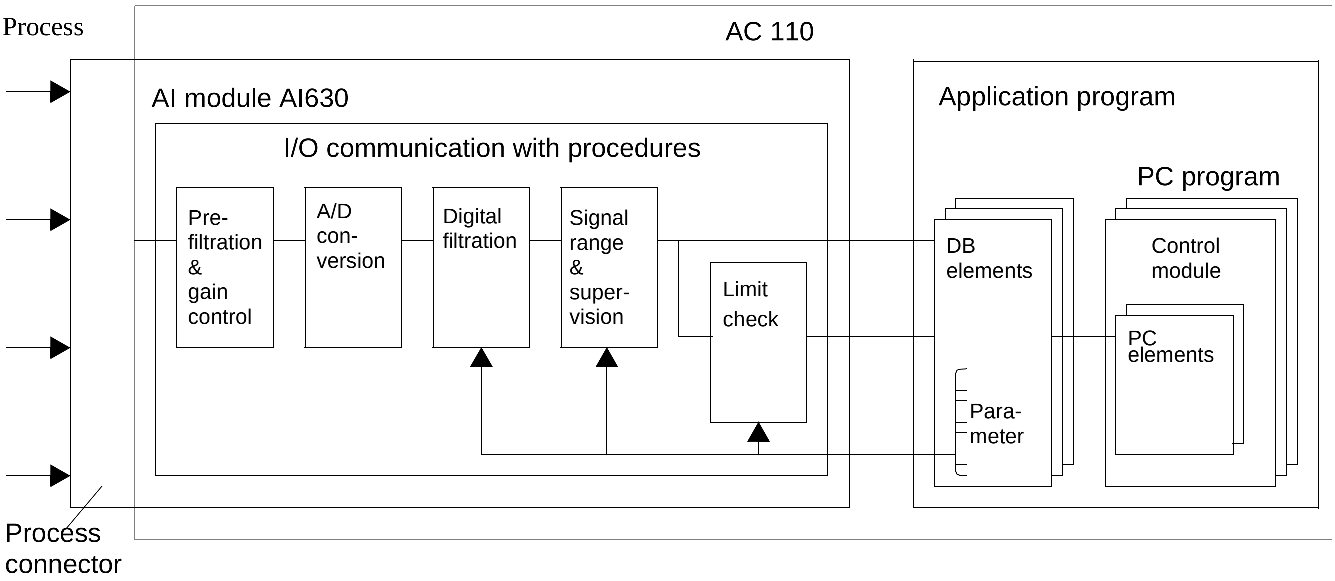


Figure 3-18. Processing of analog input signals

Filtering and A/D conversion

The input signals pass through an analog lowpass filter to remove high-frequency interference.

Filtered signals are transferred by an analog multiplexer to an instrument amplifier and conditioned for the A/D conversion.

The A/D converter integrates the input signals during one or several cycles of the mains frequency, thereby suppressing interferences from the mains frequency.

After A/D conversion, the signals are filtered a second time by a digital filter to suppress the mains frequency interference.

Signal range and supervision

Excursions of the input signal outside its permissible range, i.e., input signals five percent greater than the normal input range, are indicated as an error in the data base elements. In that case, values are represented by „NAN“ (Not a Number).

The AI630 detects an open circuit in the field wiring to the transmitter. This will be indicated as an error in the data base element.

Data base element parameters

In the database element AI630 you can select the mains frequency to be suppressed.

In the database elements AIS630, you can set the following parameters individually for each input channel:

- Channel active (on or off)
- Conversion parameter (signal range)
- Three or four wire measurement
- Two low-limit values
- Two high-limit values
- One hysteresis.

You can select whether the signal shall be active or not. If the signal is designated inactive, the value for the corresponding channel in the data base element is not updated.

The limit check can supervise four limits, two low and two high. The limits have a hysteresis which is always within the limit (see figure below). Limit values and hysteresis are determined by parameters in the data base elements. The unit of limits and hysteresis differ depending on the type of analog input module: for AI630, values are specified in degrees Celsius or Ohms.

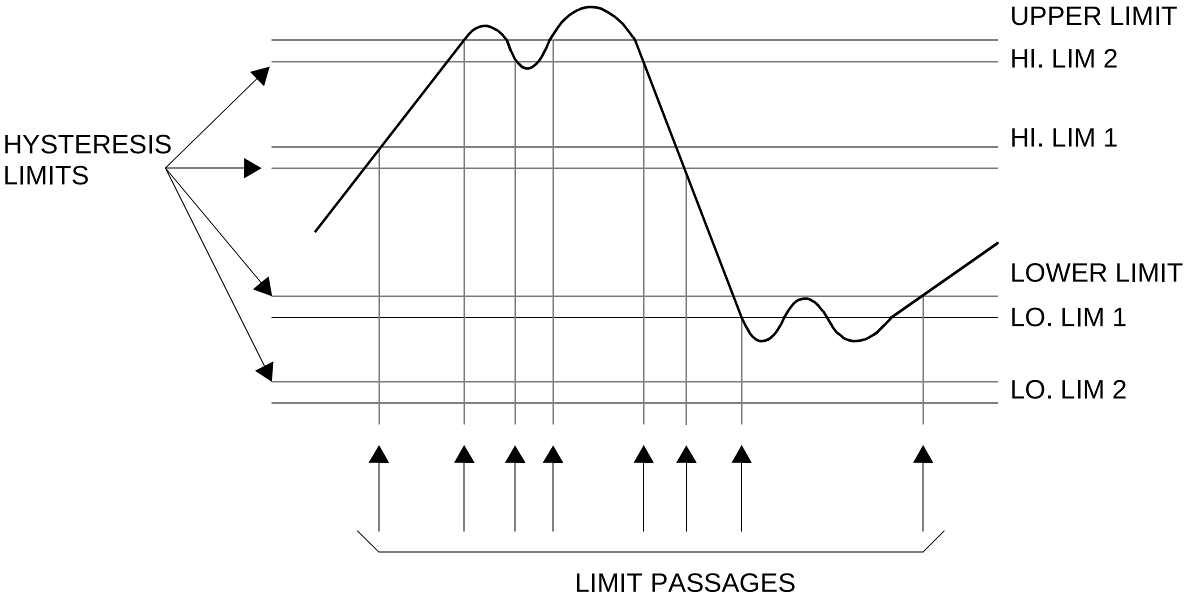


Figure 3-19. Limit check with hysteresis

The data base elements also contain information (signals) identifying which limits have been exceeded. This information (signals) is accessible for PC elements.

3.5 AI635

Summary

The analog input module AI635 converts analog input signals from transmitters to digital values required by the programmable controller.

It has 14 differential, individually isolated channels for millivolt or thermocouple inputs. Additionally, it has 2 inputs for Pt100 transmitters (four-wire connection), which can be used for cold junction (ambient) temperature compensation.

Associated data base elements

Associated data base elements are AI635 for the module and AIS635 for its input channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-5. AI635 Technical data

Analog Input	AI635
Number and type of inputs	14 differential inputs for thermocouples or millivolts 2 inputs for Pt100, four-wire
Measurement range - Thermocouple B, C, E, J, K, N, R, S, T - Millivolt	 see table below -5 to +25 mV, -10 to +50 mV, -15 to +75 mV, -25 to + 150 mV
Overrange	none
Live zero error	-
Isolation - test voltage	Each channel isolated individually 500 V rms
Input resistance	2 MOhms
Common mode voltage CMRR	100 V(1) 120 dB
Max. differential input voltage	30 V
Max. mV/TC source impedance	500 Ohms

Table 3-5. AI635 Technical data (Continued)

Analog Input	**AI635**
Analog input error - Max error at 25°C - Temp. coefficient	 0.2 % 0.003 %/°C
Resolution	14 bits
Filter - Low-pass, cutoff frequency - Mains frequency suppression at 16 2/3, 50, 60 Hz	 22 Hz 40 dB
Conversion time - per channel	 < 100 ms
Measurement cycle time - for all channels	 1.8 sec
Current consumption (from USA/USB) - typical - maximum	 90 mA 135 mA
Power dissipation - typical(2) - maximum(3)	 2.2 W 3.2 W
Weight	1.15 kg

(1) Between channel and ground
(2) At rated supply voltage, all inputs loaded at 50 %
(3) At max. supply voltage, all inputs loaded at 100 %

Table 3-6. Thermocouple types for AI635

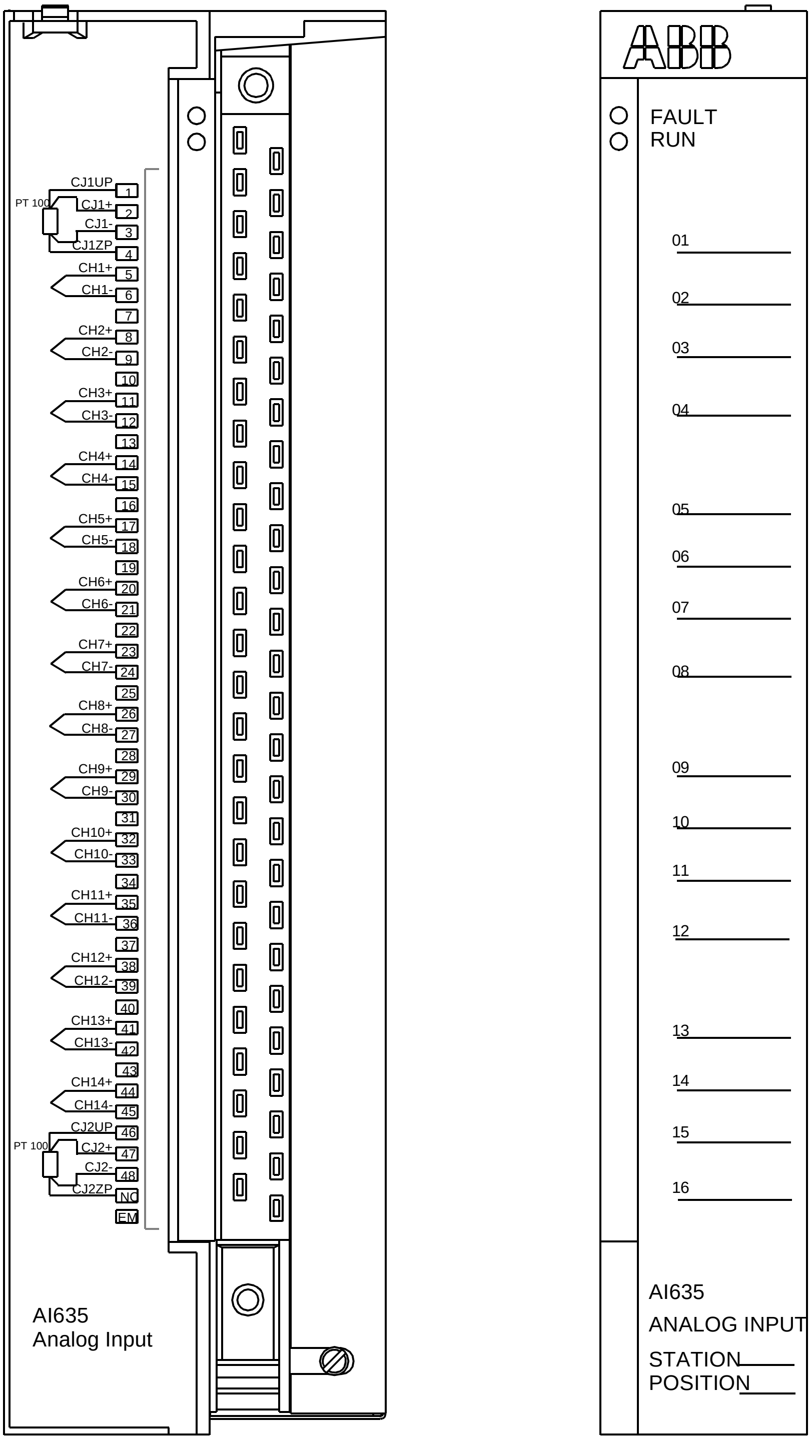
Code	Thermocouple type	Temperature range	References
B	Platinum - 30% Rhodium/ Platinum- 6% Rhodium, Pt-30Rh/Pt-6Rh	600°C to 1700°C 50°C to 1820°C	IEC 584 NIST
C	Tungsten - 5% Rhenium/ Tungsten-26% Rhenium, W-5Re/>W-26Re	0°C to 2300°C	E.g., Hoskins Mfg. Co type C. or ARI type AE. This type is not defined in any standard.
E	Nickel - 10% Chromium/ Copper - Nickel, Ni-10% Cr/Cu-/Ni	-200°C to 900°C -270°C to 1000°C	IEC 584 NIST
J	Iron/Copper - Nickel Fe/Cu-Ni	-40°C to 750°C -210°C to 760°C	IEC 584 NIST
K	Nickel - Chromium/Nickel-Aluminium, Ni-Cr/Ni-Al	-200°C to 1200°C -270°C to 1372°C	IEC 584 NIST
N	Nickel-Chromium-Silicon/ Nickel-Silicon Nirosil/Nisil	-200°C to 1200°C -270°C to 1300°C	IEC 584 NIST
R	Platinum-13% Rhodium/ Platinum Pt-13Rh/Pt	0°C to 1600°C -50°C to 1768°C	IEC 584 NIST
S	Platinum-10% Rhodium/ Platinum Pt-10Rh/Pt	-0°C to 1600°C -50°C to 1768°C	IEC 584 NIST
T	Copper/Copper - Nickel Cu/Cu-Ni	-200°C to 350°C -270°C to 400°C	IEC 584 NIST

Thermocouples according to IEC 584, tolerance classes 1, 2 and 3 (Europe) or to NIST (U.S.).

Table 3-7. Millivolt ranges for AI635

Measurement range	**Resolution (μV)**
-5 to +25 mV	3 μV
-10 to +50 mV	6 μV
-15 to +75 mV	9 μV
-25 to +150 mV	18 μV

Front view



NOTE:
14 Measurement
channels
2 CJ-channels

Figure 3-20. AI635 Front view

Process connections

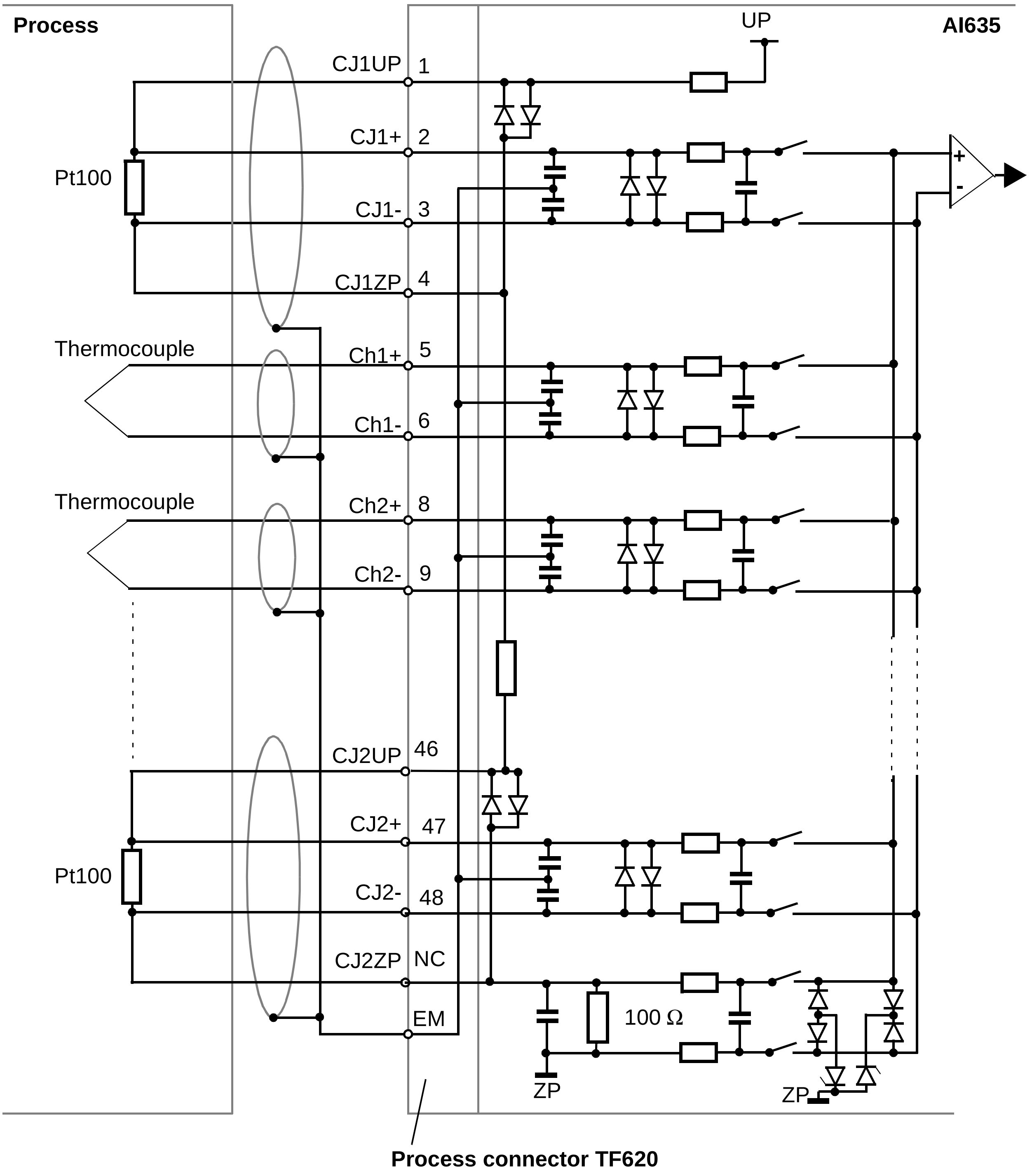


Figure 3-21. AI635 Process connections

Functional description

The analog input module AI635 has 14 input channels for millivolt or thermocouple inputs and 2 input channels for Pt100 temperature transmitters (four-wire connection), which can be used for cold junction (ambient) temperature compensation. The module converts the analog input signals to digital values required by the programmable controller.

Each of the millivolt/thermocouple input channels is isolated individually. The transmitter supply for the Pt100 transmitters is provided by the analog input module.

The module is equipped with an internal processor and analog multiplexers. The input signals pass through analog and digital filters. Interference suppression and signal filtering and offset and gain correction are performed either individually or together for all channels. Linearization for nine types of thermocouples and cold junction (ambient) temperature compensation is provided by the AI635, too. Under program control, the multiplexer connects one measurement channel at a time to the A/D converter. If a severe fault is detected, the LED (FAULT) on the front of the module lights and the internal input signals are set to “0”.

There are two LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

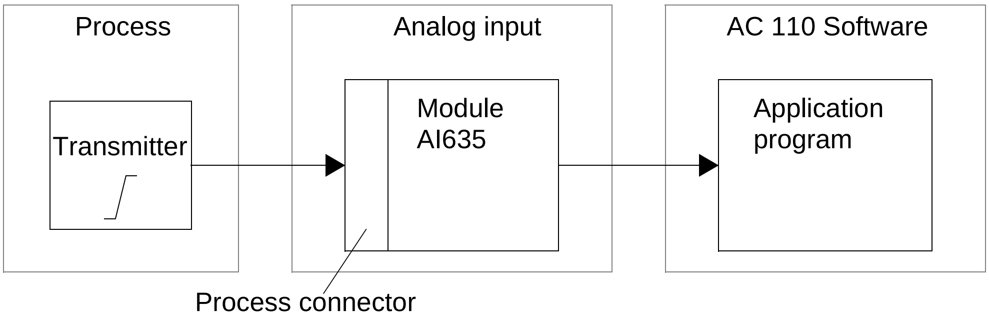


Figure 3-22. AI635 Block diagram

The hardware and software signal processing in the input module AI635 involves the following procedures:

Filtering and A/D conversion

- Prefiltering and gain control
- Conversion of analog signals to digital signals
- Digital filtering.

Signal range and supervision

- Signal range
- Linearization
- Burnout and gradient supervision
- Limit check with hysteresis.

The following diagram shows how analog signals are processed.

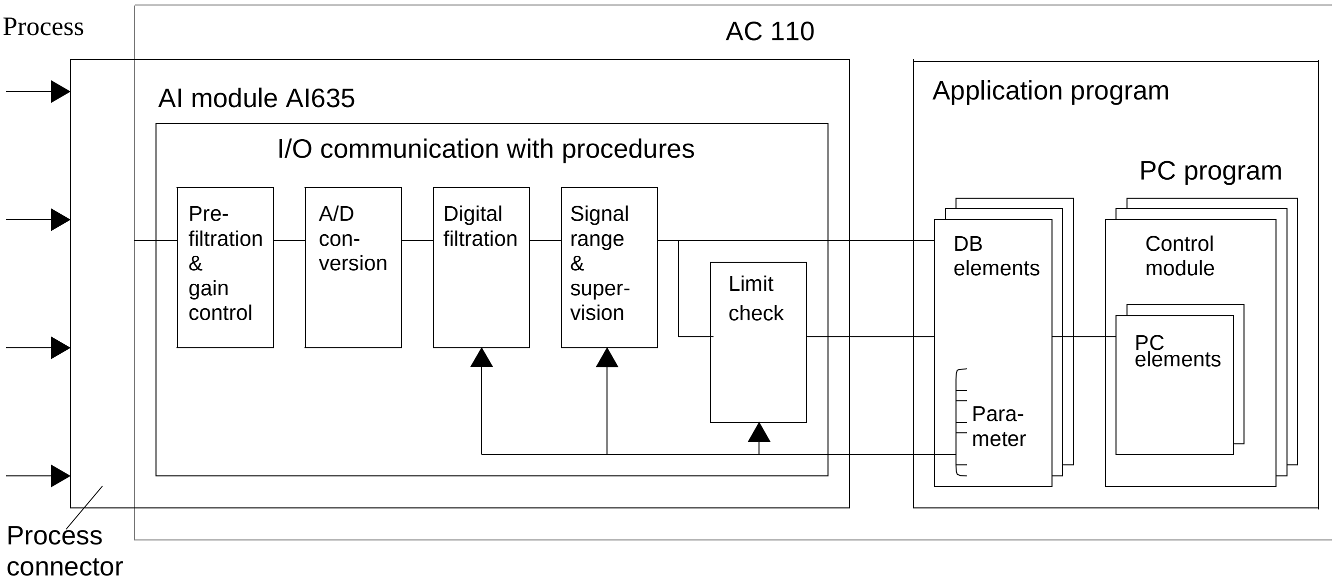


Figure 3-23. Processing of analog input signals

Filtering and A/D conversion

The input signals pass through an analog lowpass filter to remove high-frequency interference.

Filtered signals are transferred by an analog multiplexer to an instrument amplifier and conditioned for the A/D conversion.

The A/D converter integrates the input signals during one or several cycles of the mains frequency, thereby suppressing interferences from the mains frequency.

After A/D conversion, the signals are filtered a second time by a digital filter to suppress the mains frequency interference.

Signal range and supervision

For thermocouple inputs, linearization for nine types of thermocouples and cold junction (ambient) temperature compensation is provided by the AI635.

The AI635 checks the input signals for thermocouple burnout and for exceeding of a maximum gradient (detection of sensor failure). Those errors will be indicated as an error in the data base element.

Data base element parameters

In the database element AI635, you can select the mains frequency to be suppressed.

In the database elements AIS635, you can set the following parameters individually for each input channel:

- Channel active (on or off)
- Conversion parameter (signal range)
- A fixed junction temperature (-40 to +100 degrees Celsius).
- Cold junction compensation
  0 for using the fixed junction temperature
  (e.g. when a thermostatic regulated junction is used)
  1 for using Pt100 channel 1
  2 for using Pt100 channel 2
  1 & 2 for using the mean value of Pt100 channel 1 and 2
- Max. gradient (0 to 32767 degrees Celsius/sec or mV/sec). This will be used to detect sensor failures. A value of 0 will switch the gradient supervision off.
- Two low-limit values
- Two high-limit values
- One hysteresis.

You can select whether the signal shall be active or not. If the signal is designated inactive, the value for the corresponding channel in the data base element is not updated.

The limit check can supervise four limits, two low and two high. The limits have a hysteresis which is always within the limit (see figure below). Limit values and hysteresis are determined by parameters in the data base elements. The unit of limits and hysteresis differ depending on the type of analog input module: for AI635, values are specified in degrees Celsius or millivolts.

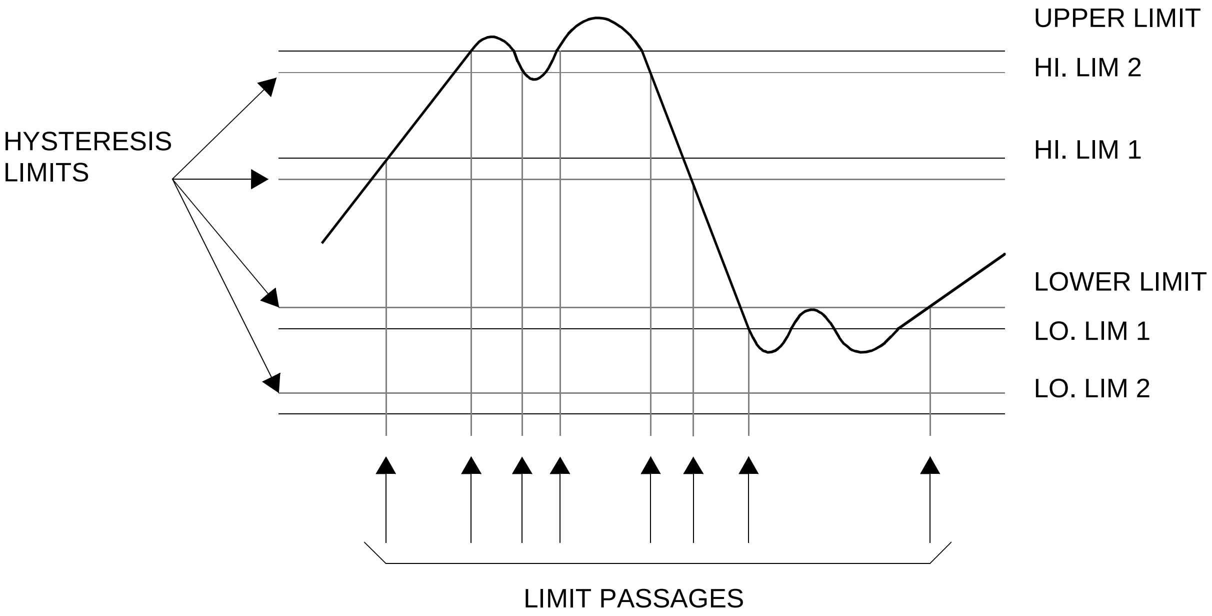


Figure 3-24. Limit check with hysteresis

The data base elements also contain information (signals) identifying which limits have been exceeded. This information (signals) is accessible for PC elements.

3.6 AO610

Summary

The analog output module AO610 converts the digital signals from the programmable controller to the analog signals needed for controlling the process. It has 16 output channels for 0 to 20 mA or 0 to 10 V.

The outpus are short-circuit and open-circuit proof. They are isolated from the power supply, but not isolated from each other.

Associated data base elements

Associated data base elements are AO610 for the module and AOS610 for its output channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-8. AO610 Technical data

Analog output	AO610
No. of outputs	16
Output range	0 to 20 mA 0 to 10 V
Overrange	0 to 21 mA 0 to 10.5 V
Isolation - in groups per - test voltage	yes, opto 16 500 V rms
Load - Current output - Voltage output	 ≤ 600 Ohms ≥ 1 kOhm
Analog output error - Maximum error at 25°C - Temp. coefficient for current - Temp. coefficient for voltage	 0.1% 0.013%/°C 0.005%/°C
Resolution	12 bit
Output transfer time	20 ms
Current consumption (from USA/USB) - typ. (all outputs loaded at 70 %) - max. (all outputs loaded at 100 %)	 346 mA 600 mA
Power dissipation - typical(1) - maximum (2)	 7.4 W 10.8 W
Weight	1.15 kg

(1) All rated supply voltage, all outputs loaded at 70 %, load resistance of 300 Ohms.
(2) At max. supply voltage, all outputs loaded at 100 %, load resistance of 0 Ohms.

Front view

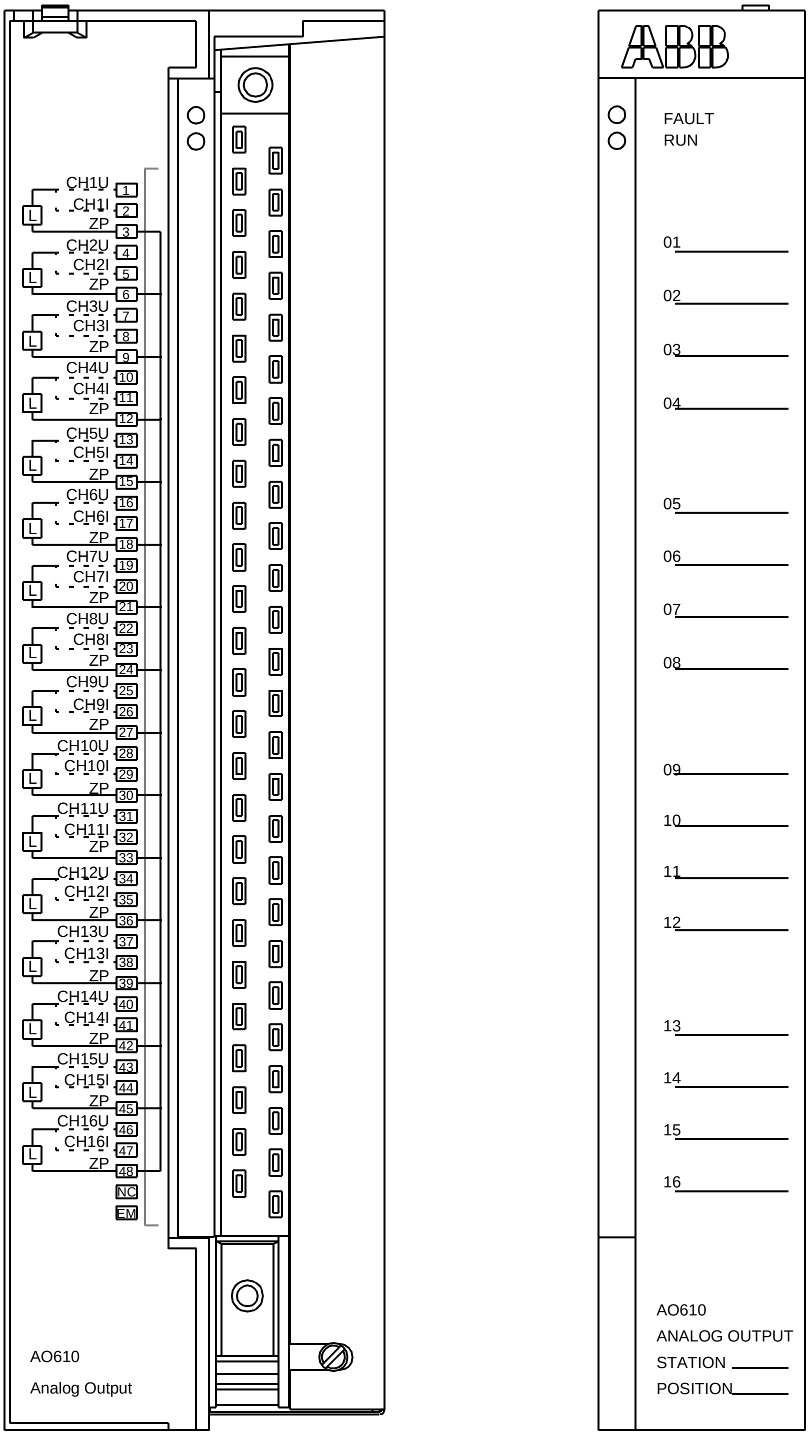


Figure 3-25. AO610 Front view

Process connections

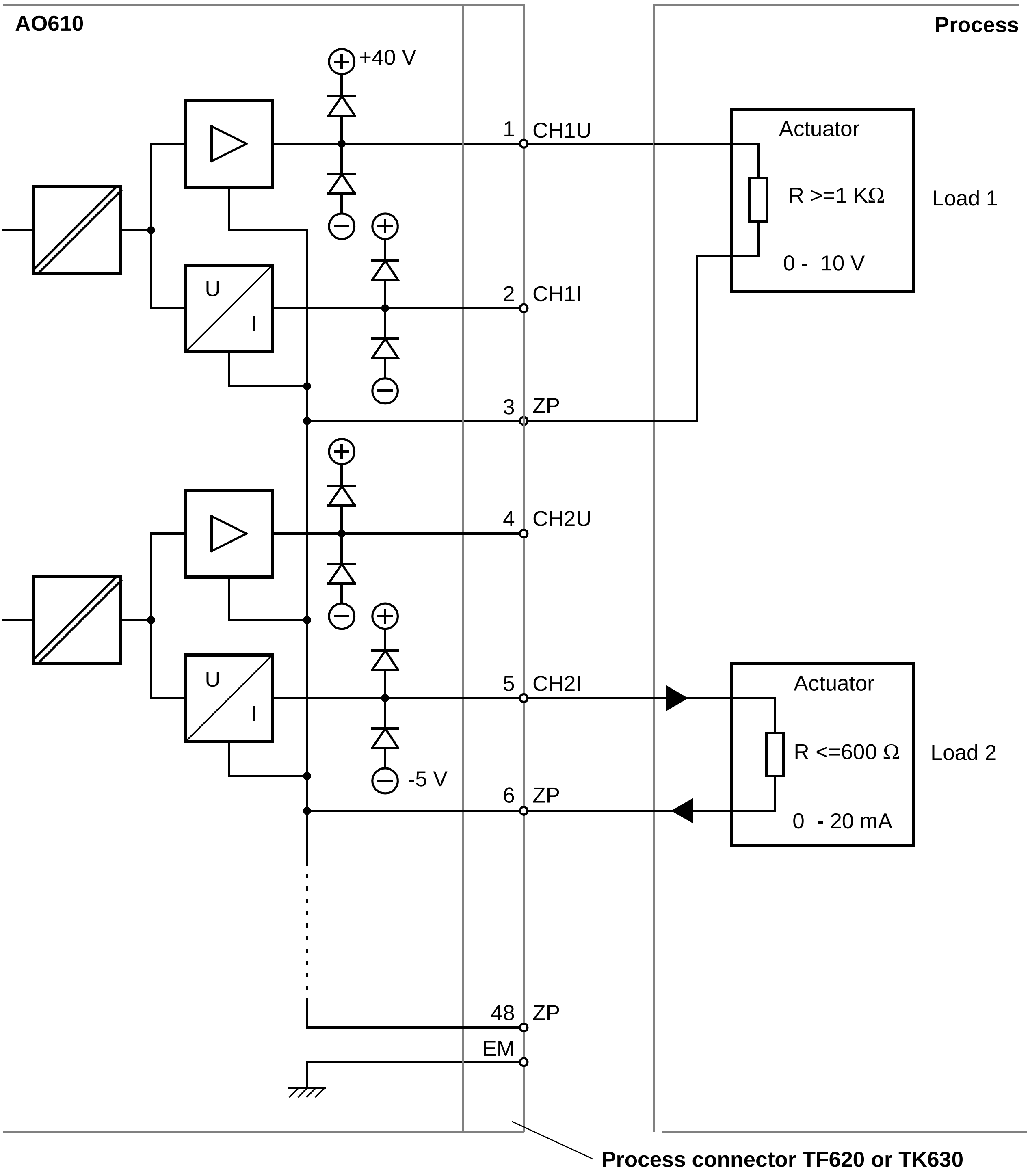


Figure 3-26. AO610 Process connections

Functional description

The analog output module AO610 has 16 output channels for 0 to 20 mA or 0 to 10 V. The outputs are short-circuit and open-circuit proof. They are isolated from the power supply, but not isolated from each other. The module converts the digital signals from the programmable controller to the analog signals needed for controlling the process.

There are two LEDs on the front of the module.

A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

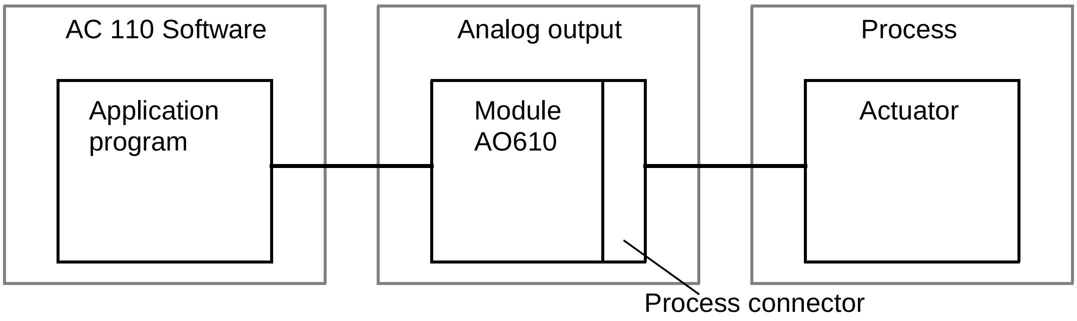


Figure 3-27. AO610 Block diagram

If a severe fault is detected, the red LED (FAULT) on the front of the module lights and the outputs are set to “0”.

After power up, all outputs will remain 0 mA/0 V until the programmable controller sets the module to the operating mode and until valid values have been written to the output registers.

If the value written to the output register exceeds the overrange (21 mA or 10.5 V), the output will be set to 0 mA/0 V. The output will remain in that state until a valid value has been written to the output register.

3.7 AO650

Summary

The analog output module AO650 converts the digital signals from the programmable controller to the analog signals needed for controlling the process. It has 8 output channels for 0 to 20 mA, 4 to 20 mA, -20 to +20 mA, 0 to 10 V, 0 to 5 V, 1 to 5 V or -10 to +10 V.

The outputs are short-circuit and open-circuit proof. They are isolated from the power supply and they are isolated from each other.

Associated data base elements

Associated data base elements are AO650 for the module and AOS650 for its output channels.

Module replacement

On-line replacement possible. No jumpering and no adjustments required.

Technical data

Table 3-9. AO650 Technical data

Analog output	AO650
No. of outputs	8
Output range	0 to 20 mA, 4 to 20 mA, -20 to +20 mA 0 to 10 V, 0 to 5 V, 1 to 5 V, -10 to +10 V
Overrange	0 to 23mA, 0 to 23 mA, -23 to +23 mA 0 to 11.5 V, 0 to 5.75 V, 0 to 5.75 V, -11 to +11 V
Isolation	yes, opto
- in groups per	Each channel isolated individually
- test voltage	500 V rms
Load	
- Current output	≤ 600 Ohms
- Voltage output	≥ 1.2 kOhm
Analog output error	
- Maximum error at 25°C	0.1%
- Temp. coefficient for current	0.007%/°C
- Temp. coefficient for voltage	0.0025%/°C
Resolution	12 bit + sign
Output transfer time	8 ms
Current consumption (from USA/USB)	
- typ. (all outputs loaded at 70 %)	450 mA
- max. (all outputs loaded at 100 %)	750 mA
Power dissipation	
- typical(1)	10.5 W
- maximum (2)	13.5 W
Weight	1.5 kg

(1) All rated supply voltage, all outputs loaded at 70 %, load resistance of 300 Ohms.
(2) At max. supply voltage, all outputs loaded at 100 %, load resistance of 0 Ohms.

Front view

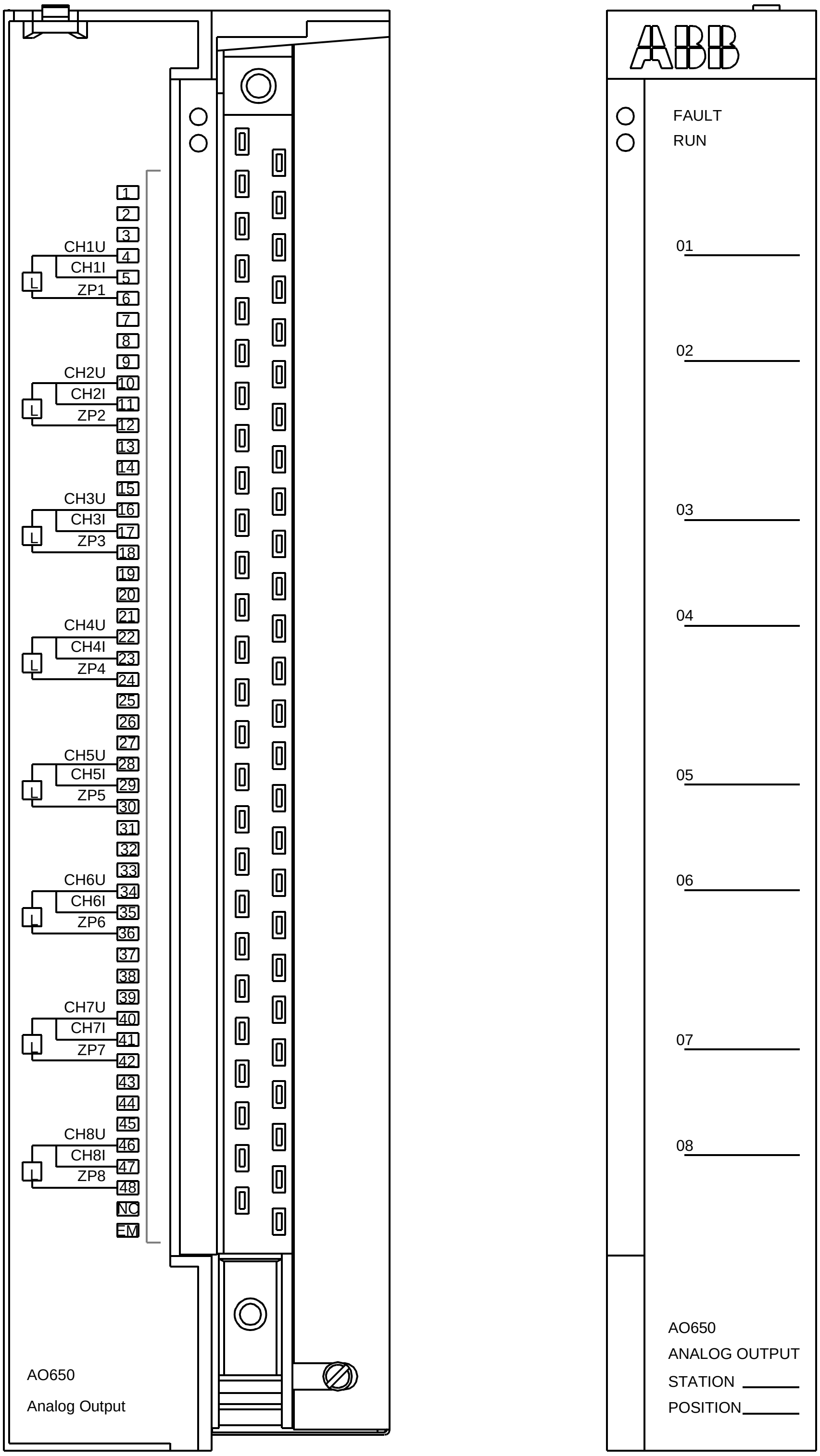


Figure 3-28. AO650 Front view

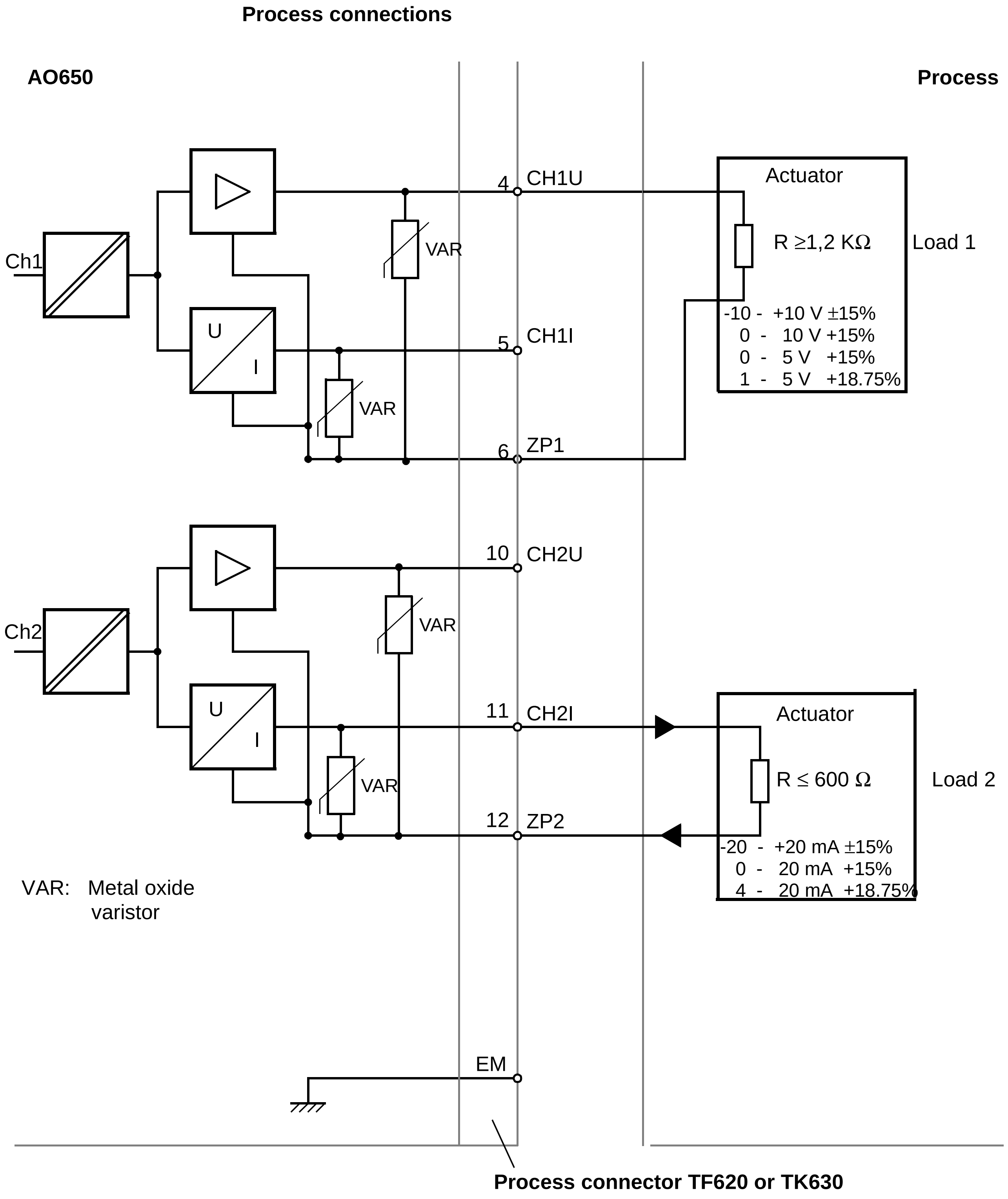


Figure 3-29. AO650 Process connections

Functional description

The analog output module AO650 has 8 output channels for 0 to 20 mA, 4 to 20 mA, -20 to +20 mA, 0 to 10 V, 0 to 5 V, 1 to 5 V or -10 to +10 V. The outputs are short-circuit and open-circuit proof. They are isolated from the power supply, and they are isolated from each other. The module converts the digital signals from the programmable controller to the analog signals needed for controlling the process.

There are two LEDs on the front of the module.

A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault.

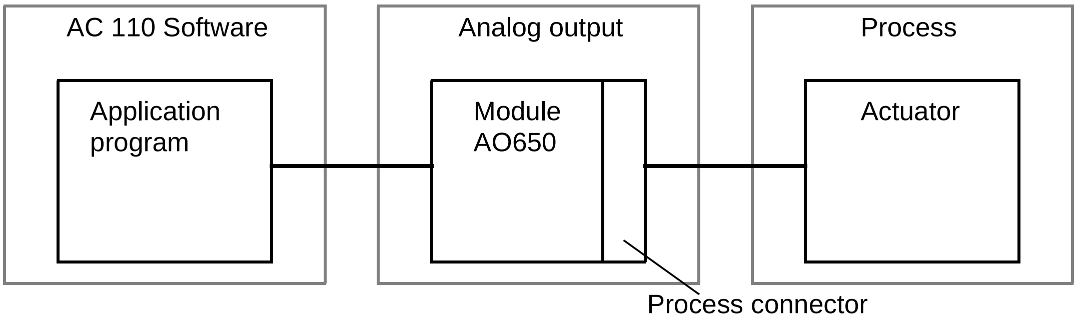


Figure 3-30. AO650 Block diagram

If a severe fault is detected, the red LED (FAULT) on the front of the module lights and the outputs are set to “0”.

After power up, all outputs will remain 0 mA/0 V until the programmable controller sets the module to the operating mode and until valid values have been written to the output registers.

Signal range

Independent of the data written to output registers, the level of the output signals will be limited to the designed overrange.

Database element parameters

Using the terminal REACT of the database element AOS650, you can select the reaction of an output in case of a CPU failure (OSP):

If REACT is set to 1 (default), in case of a CPU failure the output will be set according to the SPVAL terminal of the database element.

If REACT is set to 0, in case of a CPU failure the output will not change its level (output „frozen“).

3.8 CI610

Summary

The bus extender module for I/O station CI610 connects an Advant Controller 110 I/O station to the I/O extension bus.

The main functions are:

- Data transmission from I/O extension bus to the I/O station
- Station address decoding
- Supervision of data transfer
- System power supply supervision.

Associated data base elements

Associated data base element is CI610.

Module replacement

At the bus extender module CI610, the incoming and outgoing cables are connected together by a back-to-back adaptor of the CHAMP 24 pin according to IEEE 488, so it is possible to replace a CI610 without interrupting the whole I/O extension bus.

No jumpering and no adjustments required.

Technical data

Table 3-10. CI610 Technical data

Bus extender module for I/O station	**CI610**
Connector type	CHAMP 24 pin
Extension bus - Total cable length (TK610) - Max. number of I/O stations - Station address	 20 m 7 1 - 7
Current consumption - typ. (1) - max. (2)	 146 mA 182 mA
Power dissipation - typ. (3) - max. (4)	 3.5 W 4.5 W

(1) Typical consumption from electronic power supply USA/USB.
(2) Max. consumption from electronic power supply USA/USB at min. supply voltage.
(3) Total power dissipation at rated supply voltage.
(4) Total power dissipation at maximum supply voltage.

Front view

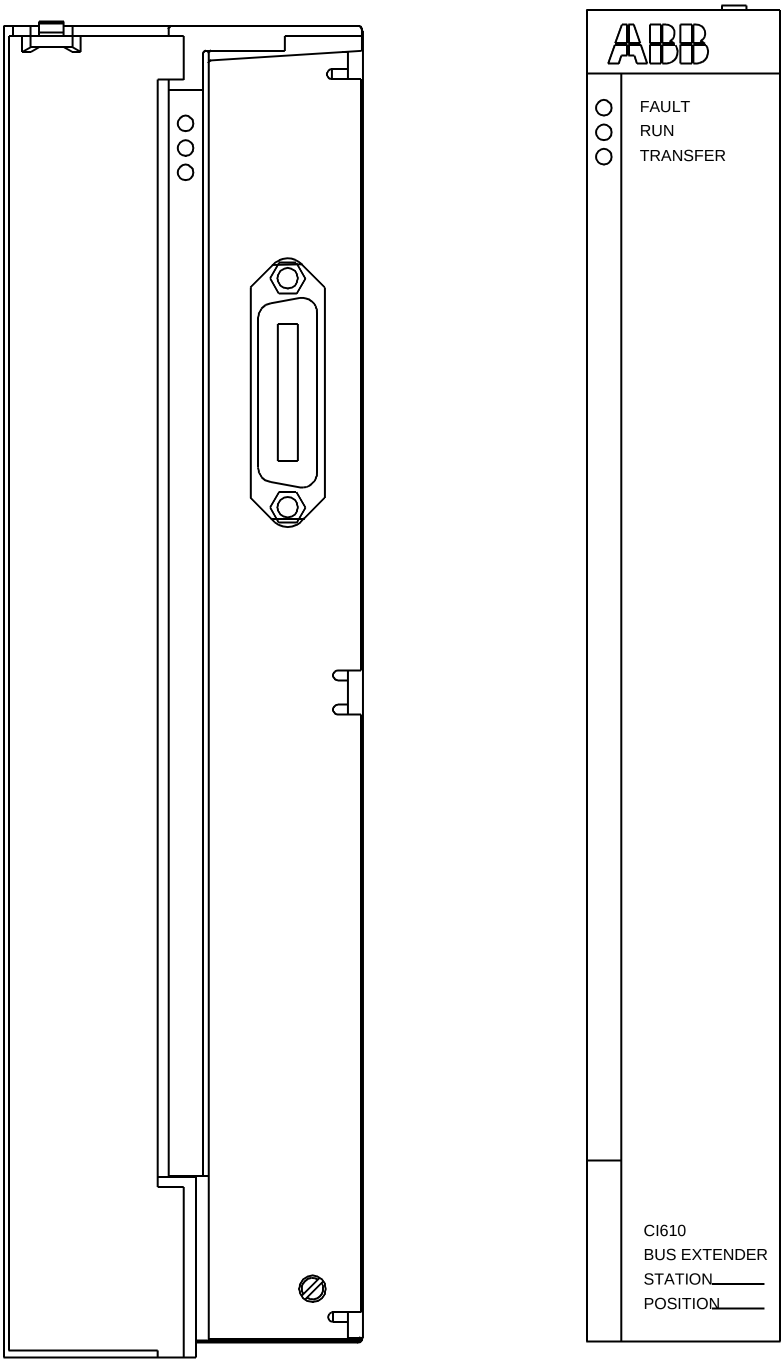


Figure 3-31. CI610 Front view

Process connections

The bus extender module CI610 isn‘t connected to the process. It is connected to a CI615 in the base station or to a CI610 in another I/O station via the bus extension cable TK610.

To the I/O modules of the I/O station, the CI610 is connected via the backplane bus.

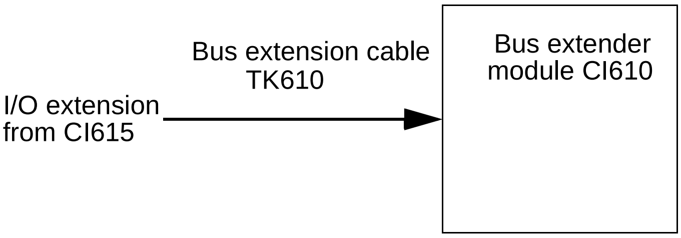


Figure 3-32. CI610 Connections

Functional description

The bus extender module for I/O station CI610 connects an I/O station to the I/O extension bus.

The main functions are:

- Data transmission from I/O extension bus to the I/O station
- Station address decoding
- Supervision of data transfer
- System power supply supervision.

It must be inserted into position 1 of the basic subrack of the I/O station.

There are three LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. Another green LED (TRANSFER) indicates that there is data transfer on the I/O extension bus.

A red LED (FAULT) signals a severe fault of the module.

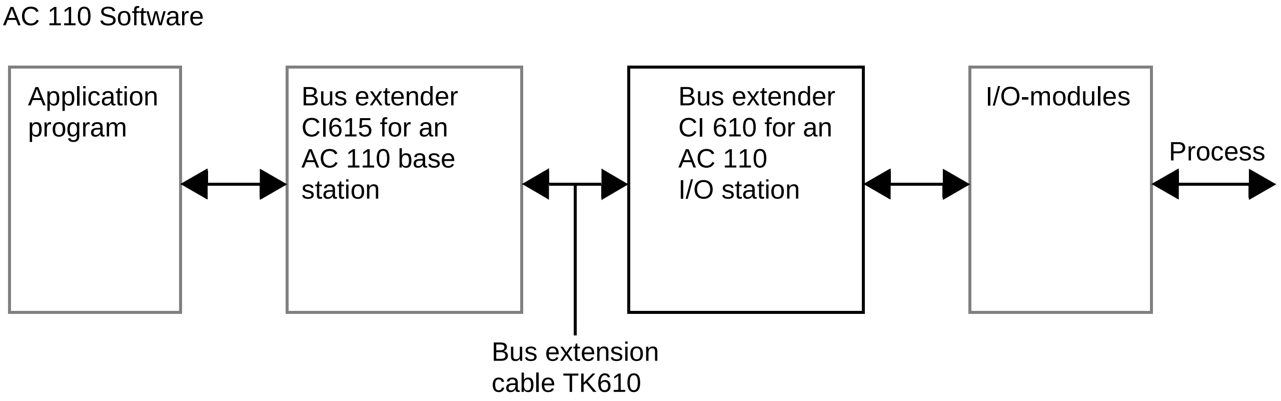

AC 110 Software
Application program
Bus extender CI615 for an AC 110 base station
Bus extender CI 610 for an AC 110 I/O station
I/O-modules
Process
Bus extension cable TK610

Figure 3-33. CI610 Block diagram

Data transmission from I/O extension bus to the I/O station

After insertion, the CI610 is in its passive state. It can be accessed by the CPU for diagnostic and configuration purposes, but no data is transferred to the I/O station in this state.

After the CPU has activated the CI610 (bus extender is set to operation and the green LED RUN is lit), the modules in the I/O station can be accessed.

Station address decoding

The CI610 decodes the station address which is selected with the station address switch. (This switch is located on the backplane of the I/O stations basic subrack.) The station address must be unique and it must be in the range of 1 to 7.

Supervision of data transfer

The data transfer supervision function checks the correct operation of the I/O extension bus and I/O station.

If a severe data transfer error is detected, the CI610 stops operating.

The OSP watchdog function supervises if the I/O station is accessed by the CPU. The OSP is activated when a time-out is detected. OSP (“output to safe position”) forces all outputs of the modules in the I/O station into a fail-safe state.

The OSP watchdog is in operation regardless of whether the modules are in the PASSIVE or ACTIVE state.

Whenever a new data transfer is started, the OSP watchdog is inactivated immediately.

OSP is stored and readable in a diagnostic register. It activates the module DB element terminal ERR (but not the red LED FAULT).

System power supply supervision

The power supplies USA and USB on the backplane are supervised by CI610. An error is signalled if the voltage is less than 17 - 15 V. This is reported in a diagnostic register (but not with the red LED FAULT). The module DB element terminal ERR becomes active.

When the power supply voltage within the module is too low, the module remains in its reset state and the red LED FAULT is lit.

3.9 CI615

Summary

The bus extender module for base station CI615 connects up to seven I/O stations, via the I/O extension bus, to a base station. Only one CI615 module can be mounted in a base station.

The main functions are:

- Data transmission from CPU to I/O extension bus
- Termination of I/O extension bus
- Detection of open-circuit cables.

Associated data base elements

Associated data base element is CI615.

Module replacement

CI615 may not be inserted or removed while the application program is running. No jumpering and no adjustments required.

Technical data

Table 3-11. CI615 Technical data

Bus extender module for base station	**CI615**
Connector type	CHAMP 24 pin
Extension bus - Total cable length (TK610) - Max. number of I/O stations	 20 m 7
Current consumption - typ.(1) - max.(2)	 146 mA 182 mA
Power dissipation - typ.(3) - max.(4)	 3.5 W 4.5 W

(1) Typical consumption from electronic power supply USA/USB.
(2) Max. consumption from electronic power supply USA/USB at min. supply voltage
(3) Total power dissipation at rated supply voltage.
(4) Total power dissipation at max. supply voltage.

Front view

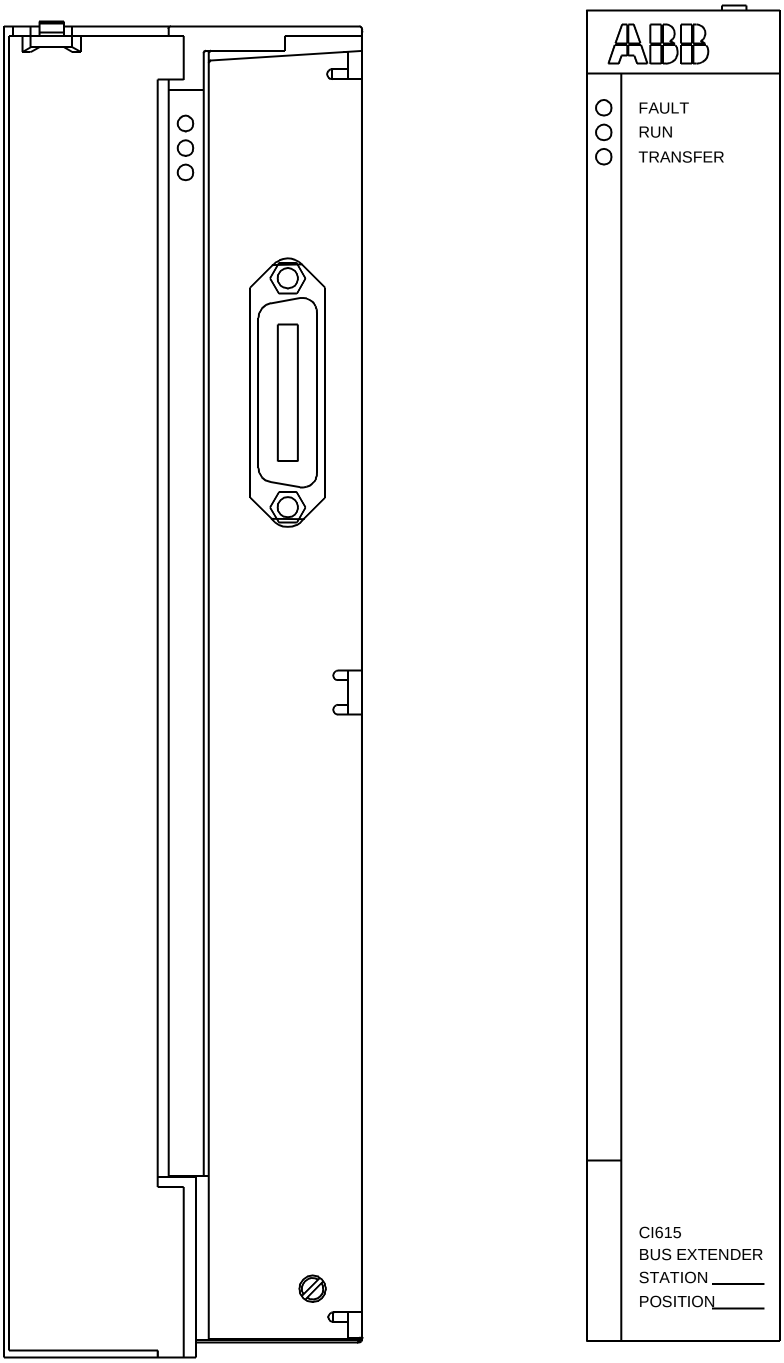


Figure 3-34. CI615 Front view

Process connections

The bus extender module CI615 isn‘t connected to the process. The I/O extension bus is connected to the CI615 with the bus extension cable TK610.

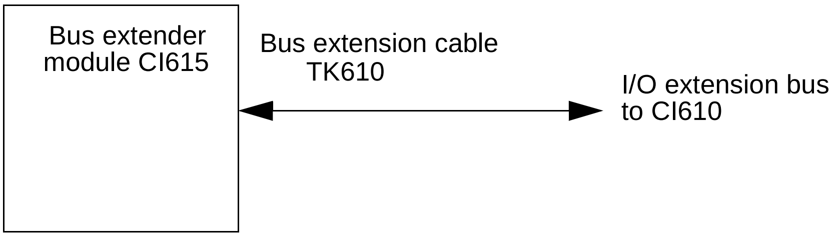

Bus extender module CI615
Bus extension cable TK610
I/O extension bus to CI610

Figure 3-35. CI615 Connections

Functional description

The bus extender module for base station CI615 connects up to seven I/O stations, via the I/O extension bus, to a base station. Only one CI615 module can be mounted in a base station.

The main functions are:

- Data transmission from CPU to I/O extension bus and vice versa
- Termination of I/O extension bus
- Detection of open-circuit cables.

The CI615 should be placed in position 2 or position 3 of the base station, near to the CPU.

There are three LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. Another green LED (TRANSFER) indicates that there is data transfer on the I/O extension bus.

A red LED (FAULT) signals a severe fault of the module.

Whenever the power supply voltage is too low, the module remains in its reset state and the red LED FAULT is lit.

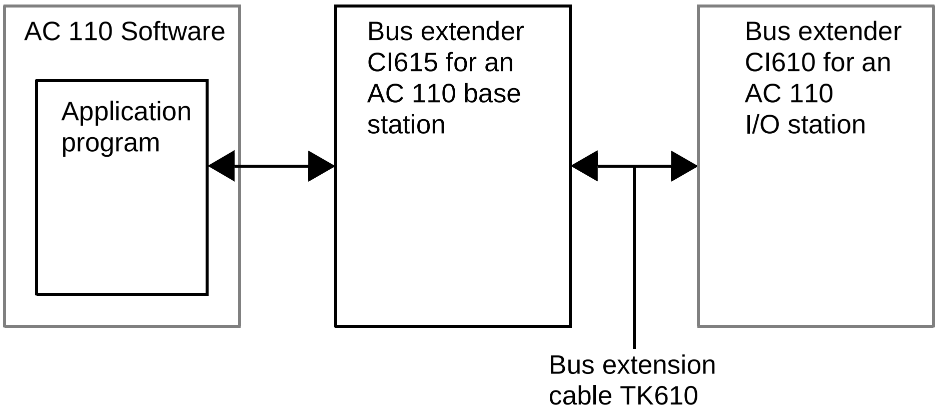

AC 110 Software
Application program
Bus extender CI615 for an AC 110 base station
Bus extender CI610 for an AC 110 I/O station
Bus extension cable TK610

Figure 3-36. CI615 Block diagram

Data transmission from CPU to I/O extension bus

After insertion, the CI615 is in its passive state. No data is transmitted to the I/O extension bus.

After the CPU has activated the CI615 (bus extender is set to operation and the green LED RUN is lit), the transfers on the I/O extension bus take place.

Termination of I/O extension bus

Both ends of the I/O extension bus have to be terminated. The termination for one end is included in the CI615. The other end of the I/O extension bus has to be terminated with a bus terminator TC610.

Detection of open-circuit cables

The I/O bus extension cable is monitored with respect to open circuits. If the bus extension cable is interrupted or is not terminated, an open circuit is detected. The module DB element terminal ERR becomes active (but the red LED FAULT will not be activated).

3.10 CI626

Summary

The module CI626 is a communication module for Advant Fieldbus 100. It is used to connect an Advant Controller 110 to the Advant Fieldbus 100 with coaxial cables.

Main functions of the CI626 are:

- Station address decoding
- Sending and receiving of process data and service data
- Bus administration
- Time synchronization (master or slave)
- Supervision
- Operation with redundant bus cables.

Associated data base elements

Associated data base element is CI626 for the module.

The data transfer via the Advant Fieldbus 100 has to be organized using data base elements DSP (Data Set Peripheral) and DAT.

Module replacement

On-line replacement possible. The communication between other stations is unaffected. No jumpering and no adjustments required.

Technical data

Table 3-12. CI626 Technical data

Communication Module	CI626
Communication connection	Coaxial bus
Connector type	BNC 75 Ohms jack
Cable type	Coaxial cable, 75 Ohms
Power dissipation -maximum	 11 W

Front view

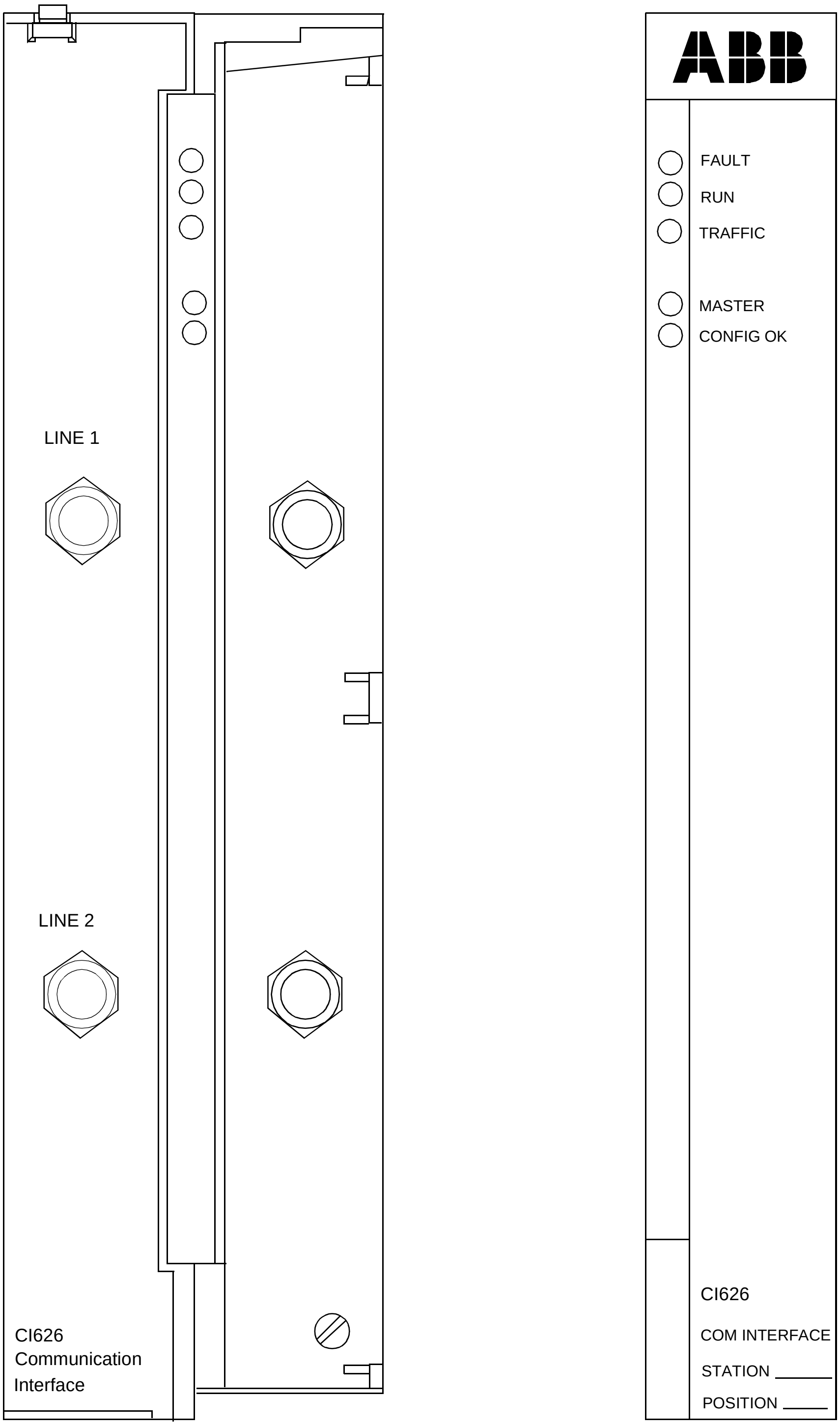
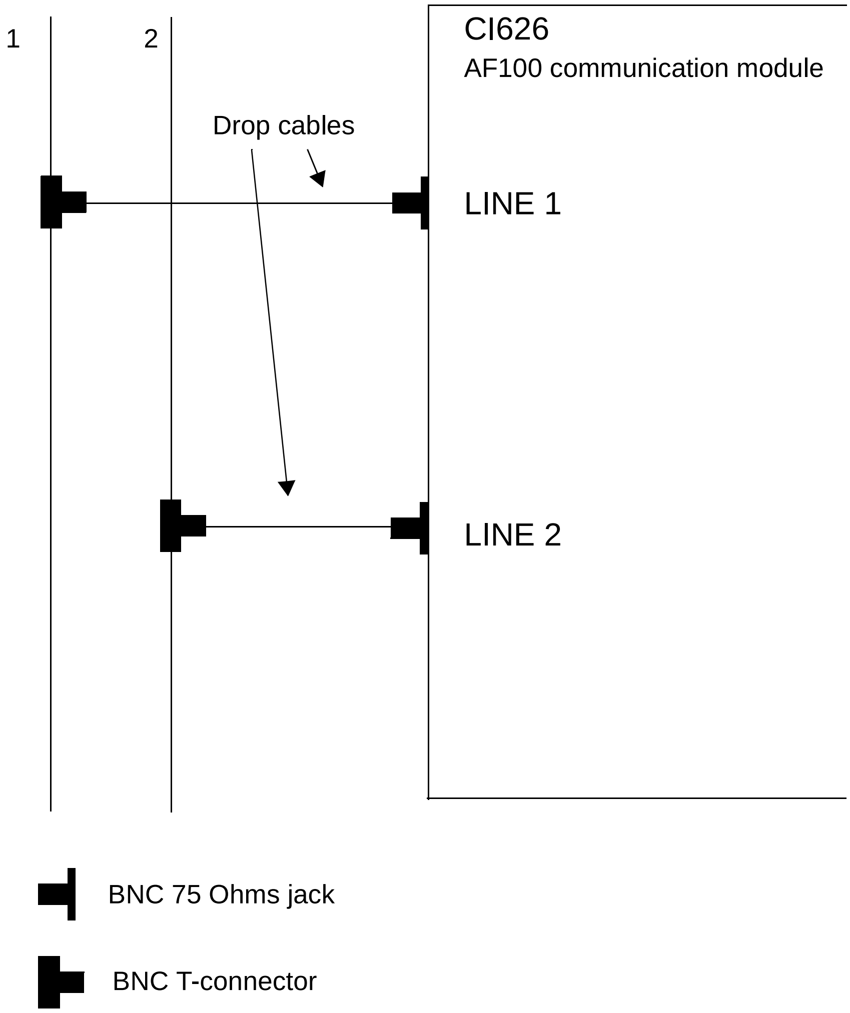


Figure 3-37. CI626 Front view

Connections

Advant Fieldbus 100



1 Red bus, bus 1 (coaxial bus cable)
2 Blue bus, bus 2 (coaxial bus cable)

Figure 3-38. CI626 Connections to Advant Fieldbus 100

Functional description

The module CI626 is a communication module for Advant Fieldbus 100. It is used to connect an Advant Controller 110 to the Advant Fieldbus 100 with coaxial cables. Up to 79 stations may be connected to this kind of bus.

Main functions of the CI626 are:

- Station address decoding
- Sending and receiving of process data and service data
- Bus administration
- Time synchronization (master or slave)
- Supervision
- Operation with redundant bus cables.

For details of the Advant Fieldbus 100 pleace refer to the manual *Advant Fieldbus 100 User‘s Guide*.

There are five LEDs on the front of the module.

Table 3-13. CI626, meaning of LEDs

LED	Indicates
FAULT	The communication module has detected a fatal hardware error and stopped communication via AF 100. In this case, the meanings of all other LEDs are different from the following descriptions—they are then used for diagnostic purposes.
RUN	The communication module is fully configured and operational.
TRAFFIC	If bus master: The LED indicates that the CI626 got an answer from another station on the bus. If bus slave: The LED indicates that the CI626 has been addressed by another station.
MASTER	This LED is on when the CI626 acts as bus master on the AF 100. This LED will be on at exactly one CI626 at a time in the network due to changing bus master responsibility.
CONFIG OK	This LED indicates that the CI626 has the same perception of the data set configuration as the (current) bus master. It will therefore participate in the sharing of the master responsibilities (if the MASTER function is enabled and the module is operational and synchronized).

An Advant Controller 110 may have together not more than two communication modules CI626 and/or CI627. The CI626 has to be located in the base station.

Station address decoding

If the communication module is located at position 2 in the basic subrack of the base station, then the module reads the station address from the station address switch (located on the backplane of the AC110 base station‘s basic subrack). The STATION attribute of the data base element CI626 must have the same value.

If the communication module is located at position 3 to 20 of the base station, then the module gets the station address from the STATION attribute of the data base element CI626.

The station address must be unique and it must be in the range of 1 to 79.

Sending and receiving of process data and service data

After insertion or power-on, the CI626 is in its passive state. In this state, no process data is transferred to or from the Advant Fieldbus 100, no bus administration and no time synchronization functions are done.

After the CPU has activated the CI626 (communication module is set to operation and the green LED RUN is lit), the CI626 will send and receive process data and service data to and from the Advant Fieldbus 100.

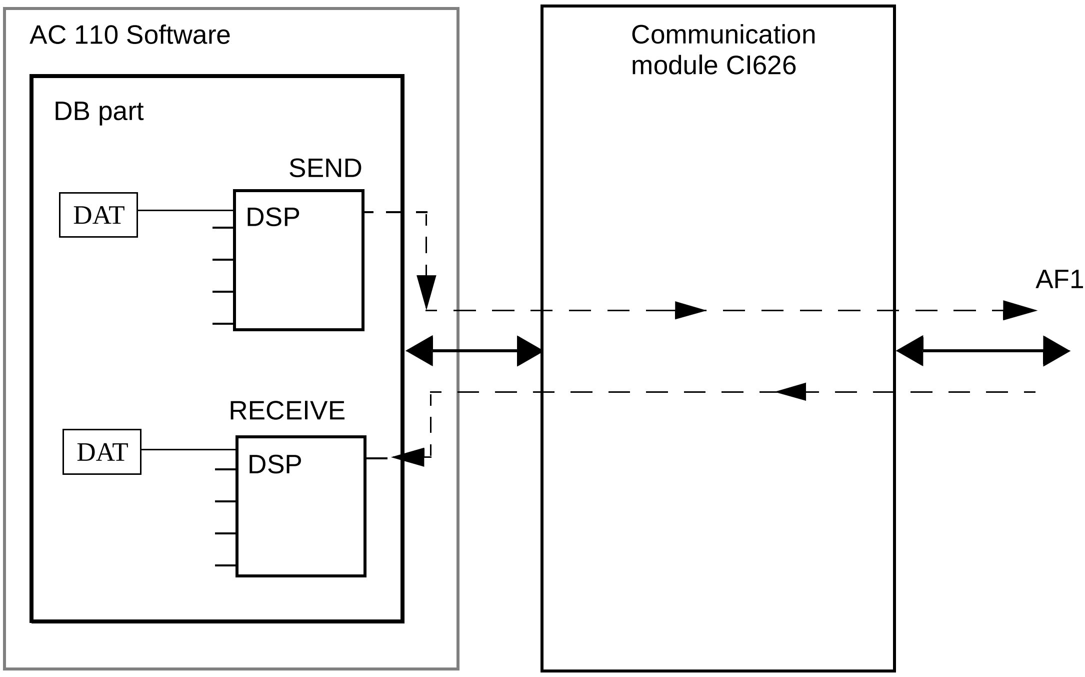


Figure 3-39. CI626 Principle of data transfer

Data exchange on AF100 is maintained by data base elements DSP. On the sending station, there is a DSP with the SOURCE attribute set to SEND. On the receiving station, there is the same DSP with the SOURCE attribute set to RECEIVE. Both data base elements have references to DAT elements.

For a CI626, the total number of DSP (send and receive) is limited to 200.

Please refer to the manual *Data Base Elements Advant Controller 100 Series* for more details about the data base elements DSP and DAT.

Service data transfer is used for communication between Advant Controller 110 and Advant Station 100 Engineering Station via the Advant Fieldbus 100.

Bus administration

The AF 100 is a bus with a bus administrator node. Data transfer on the bus is controlled by the bus master through polling of the bus nodes.

The bus master function is not associated with a specific node permanently. The function can be passed from one node to another using token passing. In this way, bus traffic is guaranteed in case of a failure of the temporary bus master, because another communication module takes over the administration function.

The bus master function can be enabled or disabled by setting the MASTER attribute of data base element CI626.

Time synchronization

The time synchronization facility enables the cyclic synchronization of the internal clocks of AC 110/AC 4xx stations within one AF 100 system.

A resolution of 100 microseconds and an accuracy of 15 milliseconds is achieved.

The TIMESYNC attribute of data base element CI626 defines the mode of time synchronization.

- NONE: Time synchronization is disabled (sending as well as receiving) and time has to be set with the Engineering Station.
- MASTER: The station is time synchronization master (sending) and correct time has to be set with the Engineering Station.
- SLAVE: The station is time synchronization slave, time telegrams are received via AF 100 and the internal clock is adjusted to the internal time of the time synchronization master. Setting of time (with the Engineering Station) is not possible.

The time synchronization function has no effect on the bus administrator function.

Supervision

The supervision function of communication module CI626 detects errors described as follows:

- low power supply voltage
- fatal hardware errors
- fatal bus disturbances.

In case of such an error, the green LED RUN turns off and the red LED FAULT goes on.

After clearing all fatal errors, the communication module is set to operation (by the CPU).

Operation with redundant bus cables

The communication module CI626 can operate with two (redundant) bus cables.

Using redundant buses, data is transferred via both cables by automatically switching between the lines. In case of a disrupted line, the CI626 communication module will switch to the intact line. The CABLE attribute of the data base element CI626 must be set to 2, in order to allow operation with redundant bus cables.

Attributes of data base element CI626

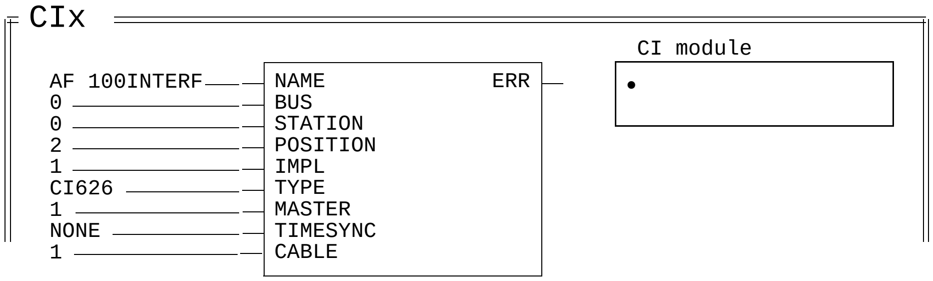


Figure 3-40. Data base element CI626

The STATION attribute defines the station address. It must be unique and it must be in the range of 1 to 79.

The MASTER attribute defines whether or not the communication module participates in bus master functions (1 for enabled bus master functions, 0 for disabled bus master functions).

The TIMESYNC attribute defines the time synchronization mode.

The CABLE attribute defines whether the optional redundant line (Line 2) is used. The value “1” means no redundant line is used, value “2” means a redundant line is used.

The ERR terminal indicates hardware errors: “0” means no error and “1” means fatal hardware error.

3.11 CI627

Summary

The module CI627 is a communication module for Advant Fieldbus 100. It is used to connect an Advant Controller 110 to the Advant Fieldbus 100 with twisted pair cables.

Main functions of the CI627 are:

- Station address decoding
- Sending and receiving of process data and service data
- Bus administration
- Time synchronization (master or slave)
- Supervision
- Operation with redundant bus cables.

Associated data base elements

Associated data base element is CI627 for the module.

The data transfer via the Advant Fieldbus 100 has to be organized using data base elements DSP (Data Set Peripheral) and DAT.

Module replacement

On-line replacement possible. The communication between other stations is unaffected. No jumpering and no adjustments required.

Technical data

Table 3-14. CI627 Technical data

Communication Module	**CI627**
Communication connection	Twisted pair bus
Connector type	Removable screw terminal
Cable type	Twisted pair. Specification according to *Advant Fieldbus 100 User's Guide.*
Power dissipation -maximum	 11 W

Front view

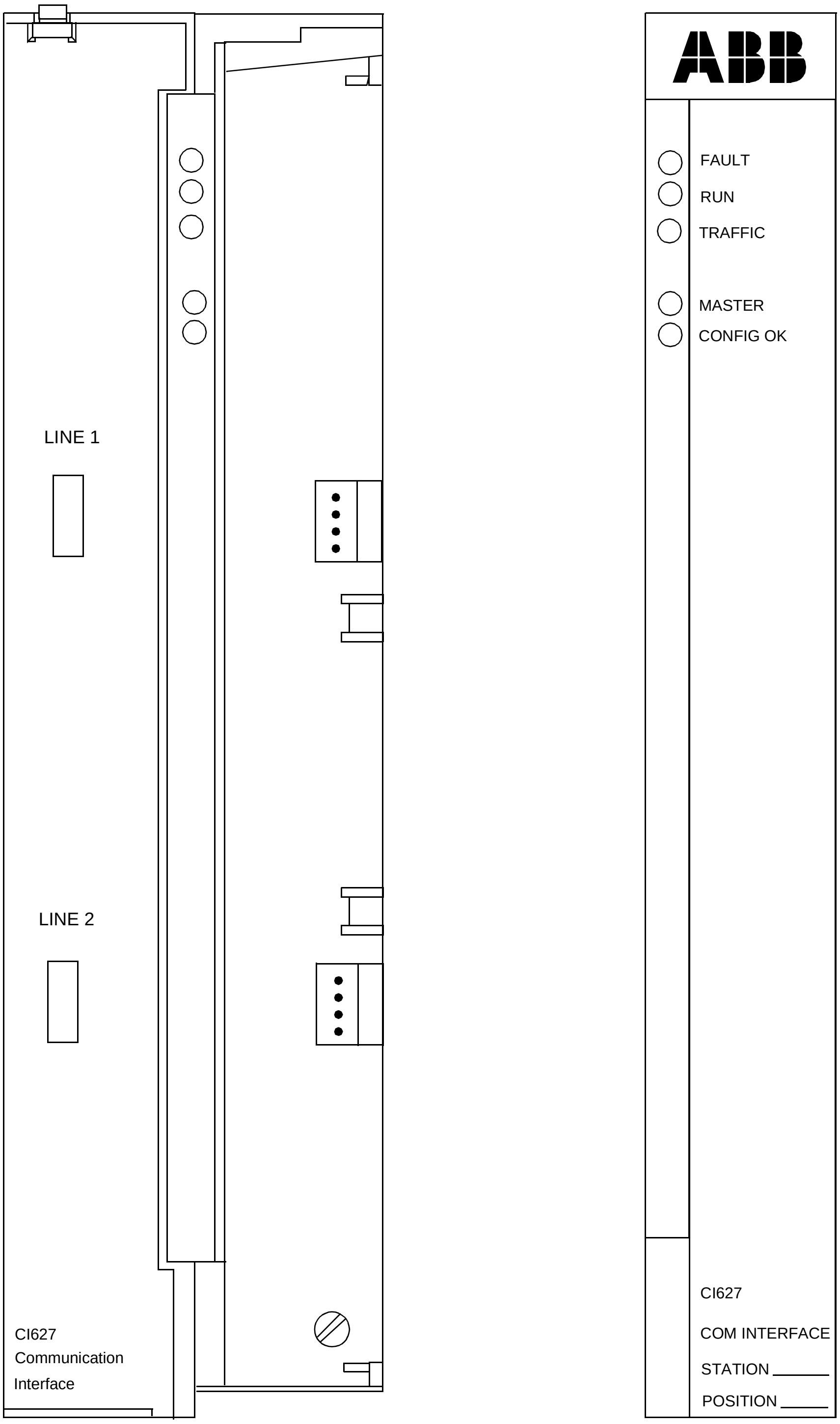


Figure 3-41. CI627 Front view

Connections

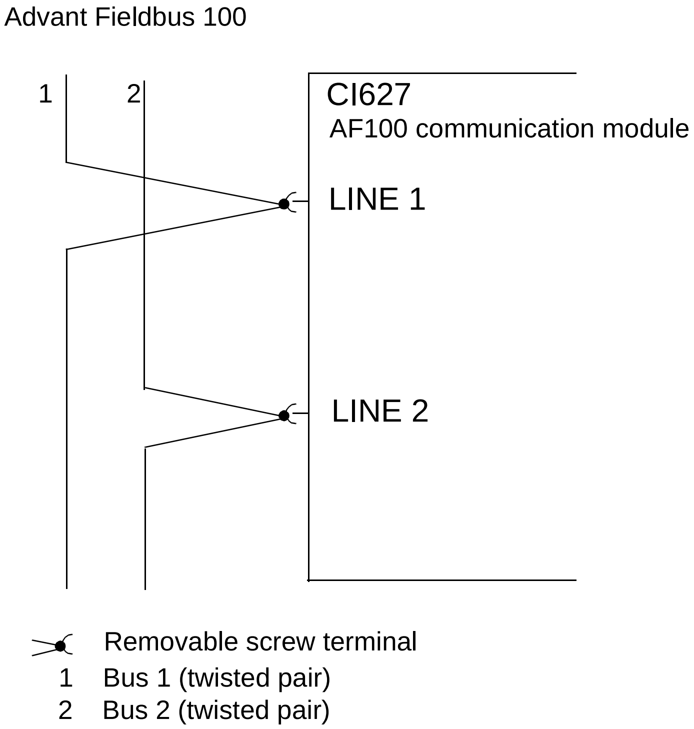


Figure 3-42. CI627 Connections to Advant Fieldbus 100

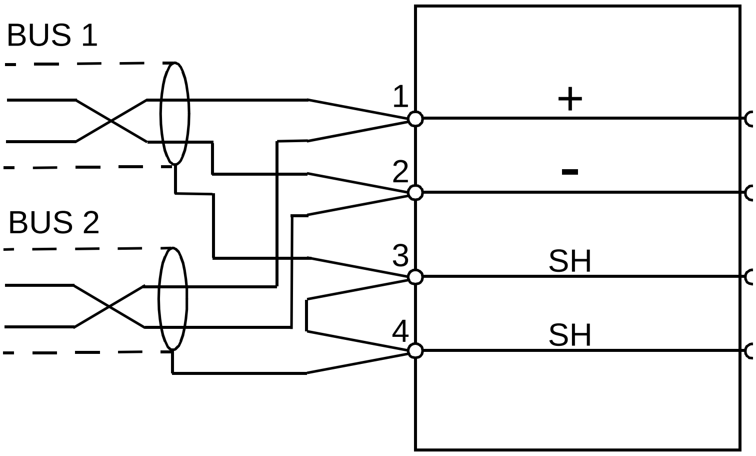


Figure 3-43. Details of connecting the removable screw terminal

Functional description

The module CI627 is a communication module for Advant Fieldbus 100. It is used to connect an Advant Controller 110 to the Advant Fieldbus 100 with twisted pair cables. Up to 32 stations may be connected to this kind of bus.

Main functions of the CI627 are:

- Station address decoding
- Sending and receiving of process data and service data
- Bus administration
- Time synchronization (master or slave)
- Supervision
- Operation with redundant bus cables.

For details of the Advant Fieldbus 100 pleace refer to the manual *Advant Fieldbus 100 User's Guide*.

There are five LEDs on the front of the module.

Table 3-15. CI627, meaning of LEDs

LED	Indicates
FAULT	The communication module has detected a fatal hardware error and stopped communication via AF 100. In this case, the meanings of all other LEDs are different from the following descriptions—they are then used for diagnostic purposes.
RUN	The communication module is fully configured and operational.
TRAFFIC	If bus master: The LED indicates that the CI627 got an answer from another station on the bus. If bus slave: The LED indicates that the CI627 has been addressed by another station.
MASTER	This LED is on when the CI627 acts as bus master on the AF 100. This LED will be on at exactly one CI627 at a time in the network due to changing bus master responsibility.
CONFIG OK	This LED indicates that the CI627 has the same perception of the data set configuration as the (current) bus master. It will therefore participate in the sharing of the master responsibilities (if the MASTER function is enabled and the module is operational and synchronized).

An Advant Controller 110 may have together not more than two communication modules CI626 and/or CI627. The CI627 has to be located in the base station.

Station address decoding

If the communication module is located at position 2 in the basic subrack of the base station, then the module reads the station address from the station address switch (located on the backplane of the AC110 base station‘s basic subrack). The STATION attribute of the data base element CI627 must have the same value.

If the communication module is located at position 3 to 20 of the base station, then the module gets the station address from the STATION attribute of the data base element CI627.

The station address must be unique and it must be in the range of 1 to 79.

Sending and receiving of process data and service data

After insertion or power-on, the CI627 is in its passive state. In this state, no process data is transferred to or from the Advant Fieldbus 100, no bus administration and no time synchronization functions are done.

After the CPU has activated the CI627 (communication module is set to operation and the green LED RUN is lit), the CI627 will send and receive process data and service data to and from the Advant Fieldbus 100.

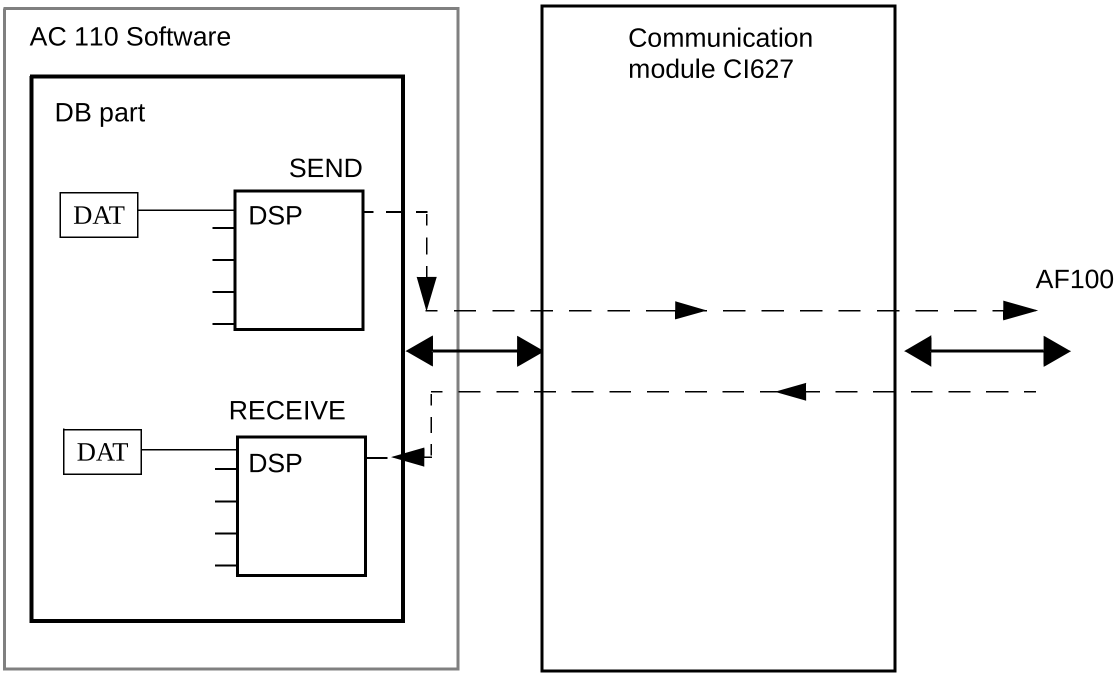


Figure 3-44. CI627 Principle of data transfer

Data exchange on AF100 is maintained by data base elements DSP. On the sending station, there is a DSP with the SOURCE attribute set to SEND. On the receiving station, there is the same DSP with the SOURCE attribute set to RECEIVE. Both data base elements have references to DAT elements.

For a CI627, the total number of DSP (send and receive) is limited to 200.

Please refer to the manual *Data Base Elements Advant Controller 100 Series* for more details about the data base elements DSP and DAT.

Service data transfer is used for communication between Advant Controller 110 and Advant Station 100 Engineering Station via the Advant Fieldbus 100.

Bus administration

The AF 100 is a bus with a bus administrator node. Data transfer on the bus is controlled by the bus master through polling of the bus nodes.

The bus master function is not associated with a specific node permanently. The function can be passed from one node to another using token passing. In this way, bus traffic is guaranteed in case of a failure of the temporary bus master, because another communication module takes over the administration function.

The bus master function can be enabled or disabled by setting the MASTER attribute of data base element CI627.

Time synchronization

The time synchronization facility enables the cyclic synchronization of the internal clocks of AC 110/AC 4xx stations within one AF 100 system.

A resolution of 100 microseconds and an accuracy of 15 milliseconds is achieved.

The TIMESYNC attribute of data base element CI627 defines the mode of time synchronization.

- NONE: Time synchronization is disabled (sending as well as receiving) and time has to be set with the Engineering Station.
- MASTER: The station is time synchronization master (sending) and correct time has to be set with the Engineering Station.
- SLAVE: The station is time synchronization slave, time telegrams are received via AF 100 and the internal clock is adjusted to the internal time of the time synchronization master. Setting of time (with the Engineering Station) is not possible.

The time synchronization function has no effect on the bus administrator function.

Supervision

The supervision function of communication module CI627 detects errors described as follows:

- low power supply voltage
- fatal hardware errors
- fatal bus disturbances.

In case of such an error, the green LED RUN turns off and the red LED FAULT goes on.

After clearing all fatal errors, the communication module is set to operation (by the CPU).

Operation with redundant bus cables

The communication module CI627 can operate with two (redundant) bus cables.

Using redundant buses, data is transferred via both cables by automatically switching between the lines. In case of a disrupted line, the CI627 communication module will switch to the intact line. The CABLE attribute of the data base element CI627 must be set to 2, in order to allow operation with redundant bus cables.

Attributes of data base element CI627

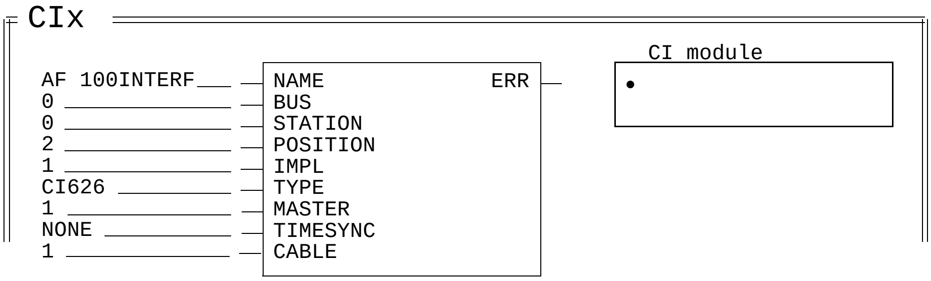


Figure 3-45. Data base element CI627

The STATION attribute defines the station address. It must be unique and it must be in the range of 1 to 79.

The MASTER attribute defines whether or not the communication module participates in bus master functions (1 for enabled bus master functions, 0 for disabled bus master functions).

The TIMESYNC attribute defines the time synchronization mode.

The CABLE attribute defines whether the optional redundant line (Line 2) is used. The value “1” means no redundant line is used, value “2” means a redundant line is used.

The ERR terminal indicates hardware errors: “0” means no error and “1” means fatal hardware error.

3.12 CI670

Summary

The module CI670 is a communication module (slave) for MasterFieldbus. It is used to connect an Advant Controller 110 as a slave node to the MasterFieldbus.

Main functions of the CI670 are:

- Sending and receiving of process data
- Supervision

Associated data base elements

Associated data base elements are CI670 for the module and CIS670 for its sixteen channels.

The data transfer via the MasterFieldbus has to be organized using PC elements MFB-IN and MFB-OUT.

Module replacement

On-line replacement possible. The communication between other stations is unaffected. No jumpering and no adjustments required.

Technical data

Table 3-16. CI670 Technical data

Communication Module	CI670
Communication connection	EIA 485 with passive terminating, short-circuit proof, non-isolated Termination: 120 Ohms (TC670) CMV: max. ±7 V Signal protocol: SDLC Signal coding: NRZI, CRC-16 prot. Comm. speed: 375 kBaud
Max. number of slave nodes	16
Connector type	Standard process connector TF620
Cable for SDB	According to SDB-cable specification in the manual *MasterFieldbus and S400 I/O*.
Current consumption - typ. (1) - max. (2)	 154 mA 305 mA
Power dissipation - typ. (3) - max. (4)	 3.7 W 5.5 W

(1) Typical consumption from electronic power supply USA/USB.
(2) Max. consumption from electronic power supply USA/USB at min. supply voltage.
(3) Total power dissipation at rated supply voltage.
(4) Total power dissipation at max. supply voltage.

Front view

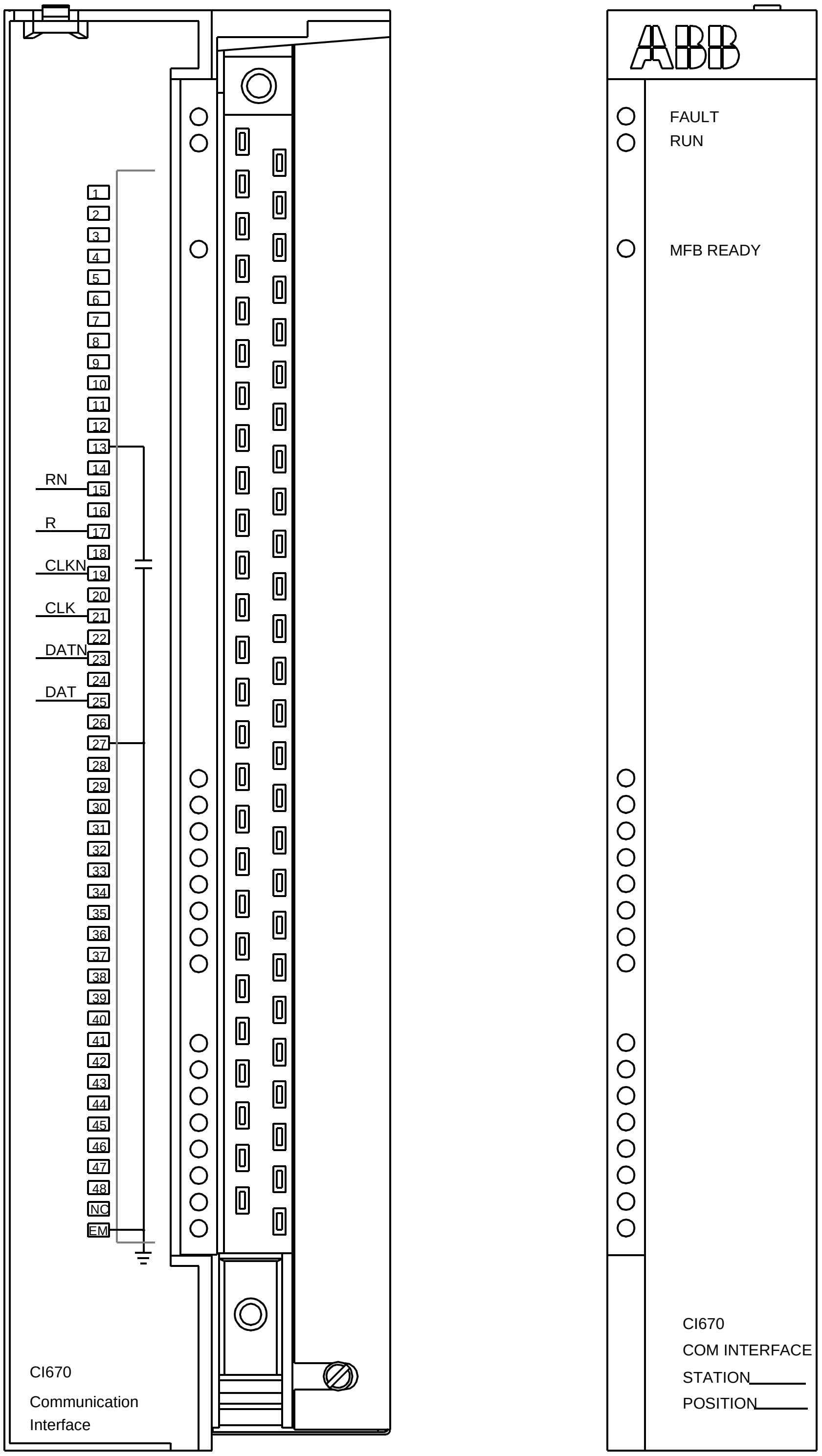


Figure 3-46. CI670 Front view

Connections

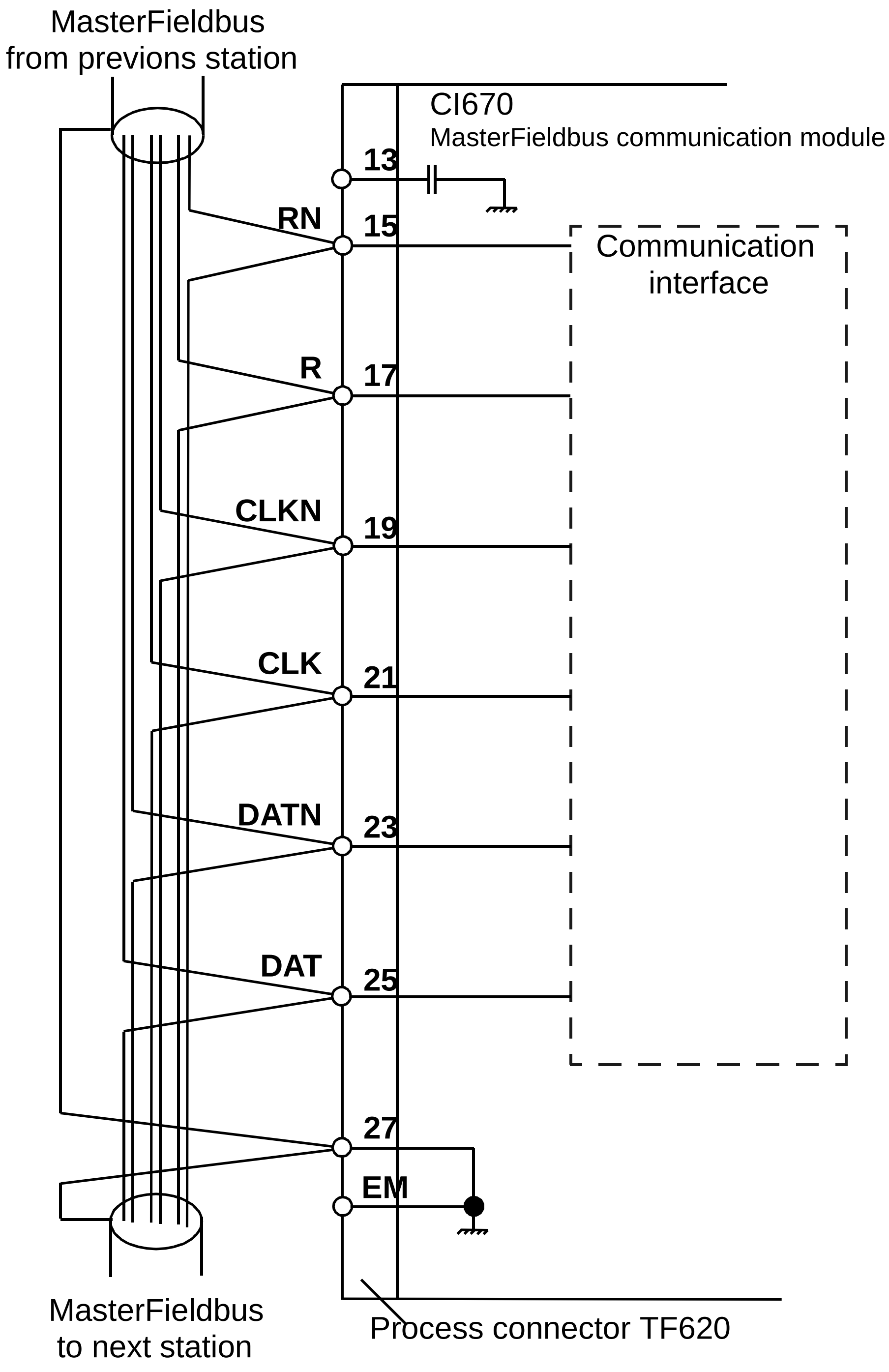


Figure 3-47. CI670 Connections to MasterFieldbus

If the CI670 is located at the far end of the MasterFieldbus, a bus terminator TC670 must be connected instead of the second cable.

Functional description

The module CI670 is a communication module (slave) for MasterFieldbus. It is used to connect an Advant Controller 110 as a slave node to the MasterFieldbus. Up to 16 Advant Controller 110 stations may be connected as slave nodes to the bus.

Main functions of the CI670 are:

- Sending and receiving of process data
- Supervision

For details of the MasterFieldbus please refer to the manual *MasterFieldbus and S400 I/O.*

There are nineteen LEDs on the front of the module.

Table 3-17. CI670, meaning of LEDs

LEDs	Meaning
FAULT (red)	Indicates module errors
RUN (green)	Indicates operation of the module
MFB READY (yellow)	This LED is always lit (for future use)
NODE 00 (yellow) .. NODE 15 (yellow)	16 LEDs indicating the state of up to 16 MasterFieldbus nodes. Each LED can indicate three different states: Dark: Node is not configured; Flashing: Node is configured but no valid data has been received from bus master since approximately one second; Lit: Node is configured and valid data is received from the bus master.

An Advant Controller 110 may have up to 4 communication modules CI670, each for connecting the AC 110 station to a different MasterFieldbus. Like an I/O module, the CI670 can be located on position 2 to 20 of a base station or I/O station.

On the MasterFieldbus, one CI670 can emulate up to 16 slave nodes. Setting the ACT attribute of a data base element CIS670 to 1 will enable the emulation of one slave node. Resetting the attribute to 0 will disable the emulation of a slave node.

The sum of all slave nodes on a MasterFieldbus (including the emulated slave nodes) must not exceed 16. Slave nodes which are not occupied by the CI670 can be used to connect other units to the MasterFieldbus.

Sending and receiving of process data

After insertion or power-on, the CI670 is in its passive state. In this state, no process data is transferred to or from the MasterFieldbus.

After the CPU has activated the CI670 (communication module is set to operation and the green LED RUN is lit), the CI670 will send and receive process data to and from the MasterFieldbus.

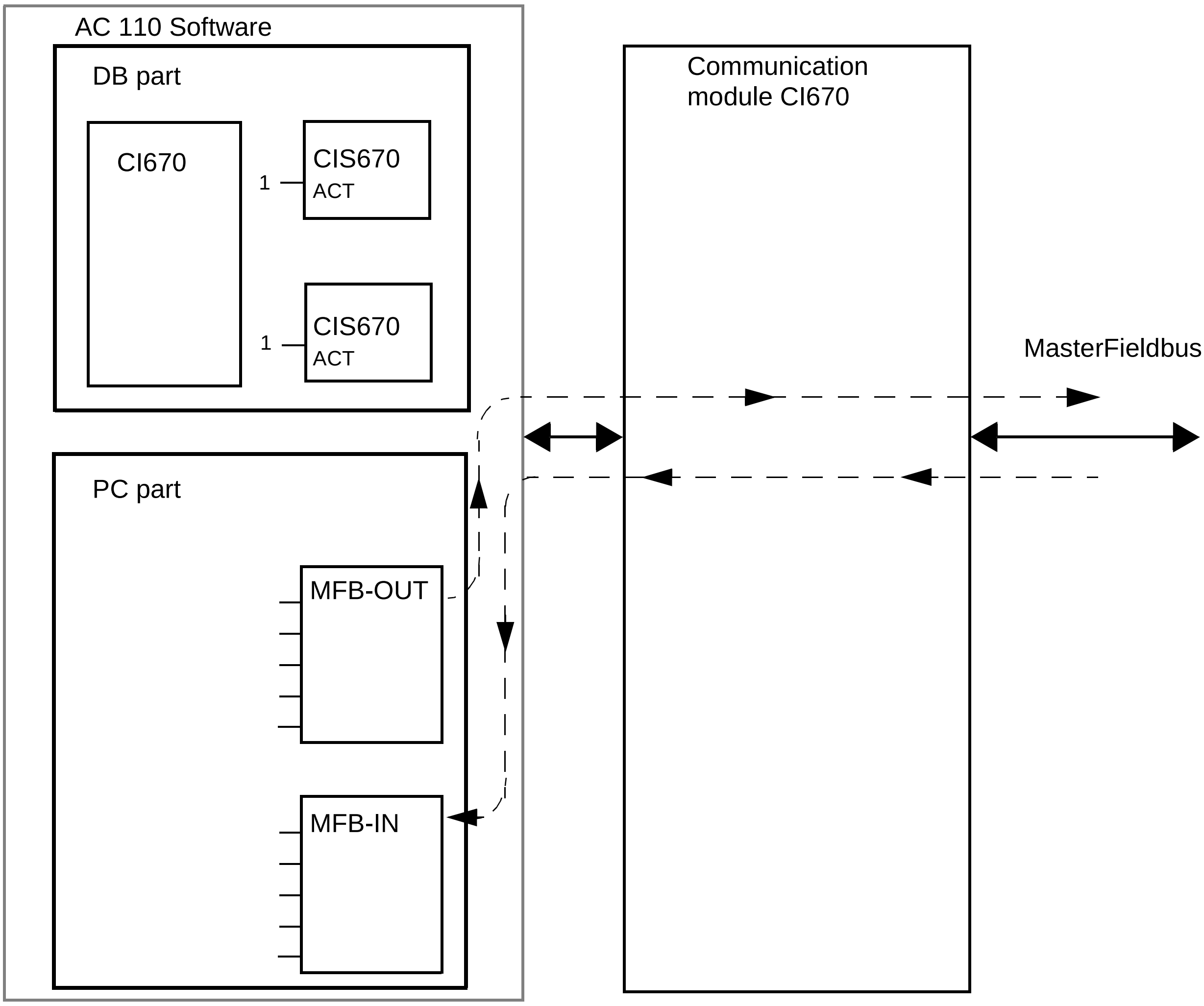


Figure 3-48. CI670 Principle of data transfer

Data exchange on MasterFieldbus is maintained by PC elements MFB-OUT and MFB-IN. On the sending node, there is a MFB-OUT. On the receiving node, there is a corresponding MFB-IN.

For one CI670, you will have together as many MFB-OUT and MFB-IN as you have (emulated) nodes. That is for each MFB-IN or MFB-OUT you need exactly one data base element CIS670 with the ACT attribute set to 1.

Please refer to the manuals *PC Elements Advant Controller 100 Series* and *Data Base Elements Advant Controller 100 Series* for more details.

Supervision

When the supervision function of the CI670 detects an error, it will act as follows:

- Low power supply voltage
  Green LED RUN off, red LED FAULT on.
  Module is in its passive state.
- Fatal hardware error
  Green LED RUN off, red LED FAULT on,
  ERR attribute of data base element CI670 set.
- Front connector removed
  Green LED RUN off,
  ERR attribute of data base element CI670 set.
- Error on the MasterFieldbus
  ERR attribute of data base element CI670 set,
  ERR terminal and ERRTYPE terminal of PC element MFB-IN or MFB-OUT set.
  (Please refer to the manual *PC Elements Advant Controller 100 Series* for more details.)

Short description of MasterFieldbus

The MasterFieldbus SDB (Short-Distance Bus) is intended for serial communication up to 25 m long because the maximum ground potential difference on the SDB must be within ±7 V in order to guarantee proper operation. The length of the Long-Distance Bus (LDB) can be increased to 3000 m using optical fiber cables or up to 750 m using coaxial cables.

The communication interface CI670, as well as the MasterPiece 200/1 DSCS 131 fieldbus controller, is always connected to the SDB. To achieve LDBs, connect modems DSTC 454 (for optical fiber cable) or DSTC 452 (for coaxial cable) to SDBs.

To a MasterPiece 200/1 station, you can connect four fieldbuses, each with up to 16 Advant Controller 110 stations.

Transmission speed is 375 kBaud (fixed). With a maximum bus configuration (e.g., 16 active nodes on one fieldbus), data is transmitted from each Advant Controller 110 to MasterPiece 200/1 at 50 ms intervals.

Physically, MasterFieldbus consists of a DSCS 131 fieldbus controller mounted in the CPU rack of the MasterPiece 200/1, a DSTC 408 connection unit, a SDB formed by a screened twisted pair cable, and one or more CI670 communication modules. For LDBs, additional modems and appropriate coaxial or optical fiber cables are used.

You can connect up to 10 modems to a LDB. Two LDBs cannot be connected in series with intermediate SDBs.

The termination resistors of the SDB are incorporated in the DSCS 131 fieldbus controller.

If a CI670 is located at the far end of the SDB, a bus terminator TC670 must be connected.

For a detailed description of the MasterFieldbus, including installation guidelines, see the manual *MasterFieldbus* and *S400 I/O.*

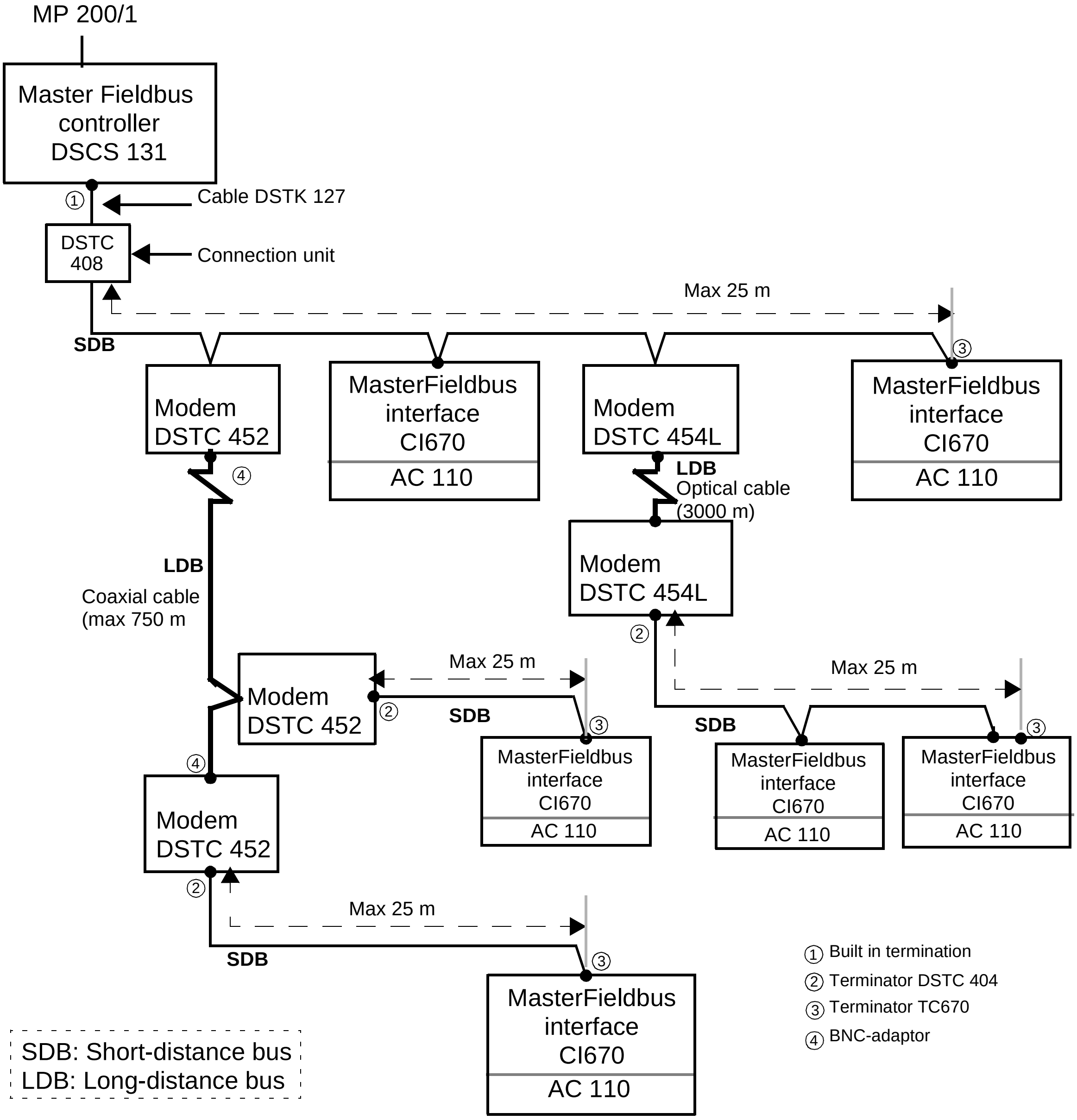


Figure 3-49. Advant Controller 110 connection to MasterFieldbus via CI670

Example: Advant Controller 110 connected to MasterPiece 200/1

Within a MasterPiece 200/1 station, one fieldbus controller DSCS 131 is required per MasterFieldbus. You can install a total of four DSCS 131. With one MasterFieldbus, you can interconnect up to 17 nodes, one master and up to 16 slaves. One CI670 communication module can emulate up to 16 slave nodes. You can connect one Advant Controller 110 to several MFBs (with several CI670). The figure below shows a configuration example.

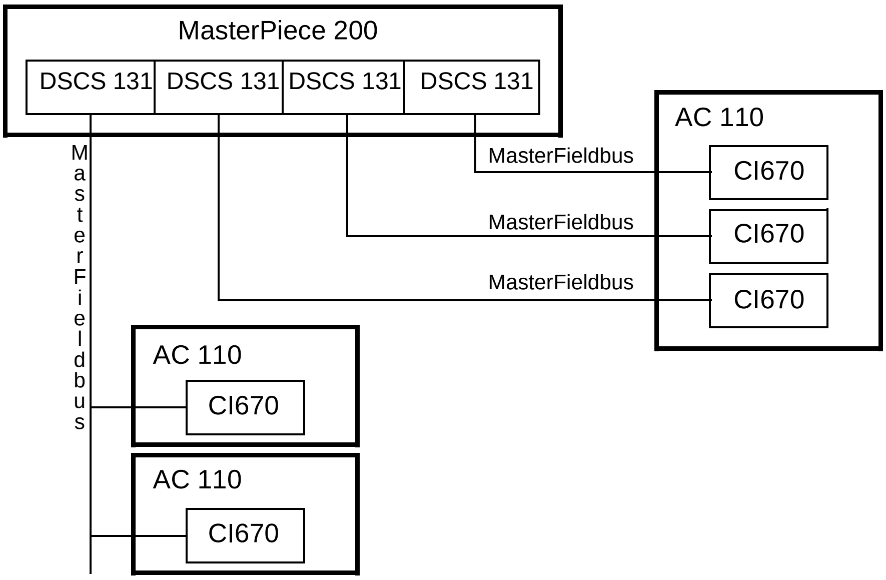


Figure 3-50. Configuration example with CI670

Figure 3-51 shows the data flow between the Advant Controller 110 and the MasterPiece 200/1 at the PC/DB elements level.

The two PC element types MFB-IN and MFB-OUT exist on both partners.

NOTE

The use of the IDENT terminal in the PC elements MFB-IN and MFB-OUT is different in AC 110 and MP 200/1, respectively.

On the Advant Controller 110, for each CI670 you have one data base element CI670 for the module and 16 data base elements CIS670 for up to sixteen slave nodes to be emulated. The PX unit on MasterPiece 200/1 is a generic element and has no channel-specific parts. Please refer to the manuals *Data Base Elements AC 100 Series* and *Data Base Elements MasterPiece 200/1* for detailed descriptions.

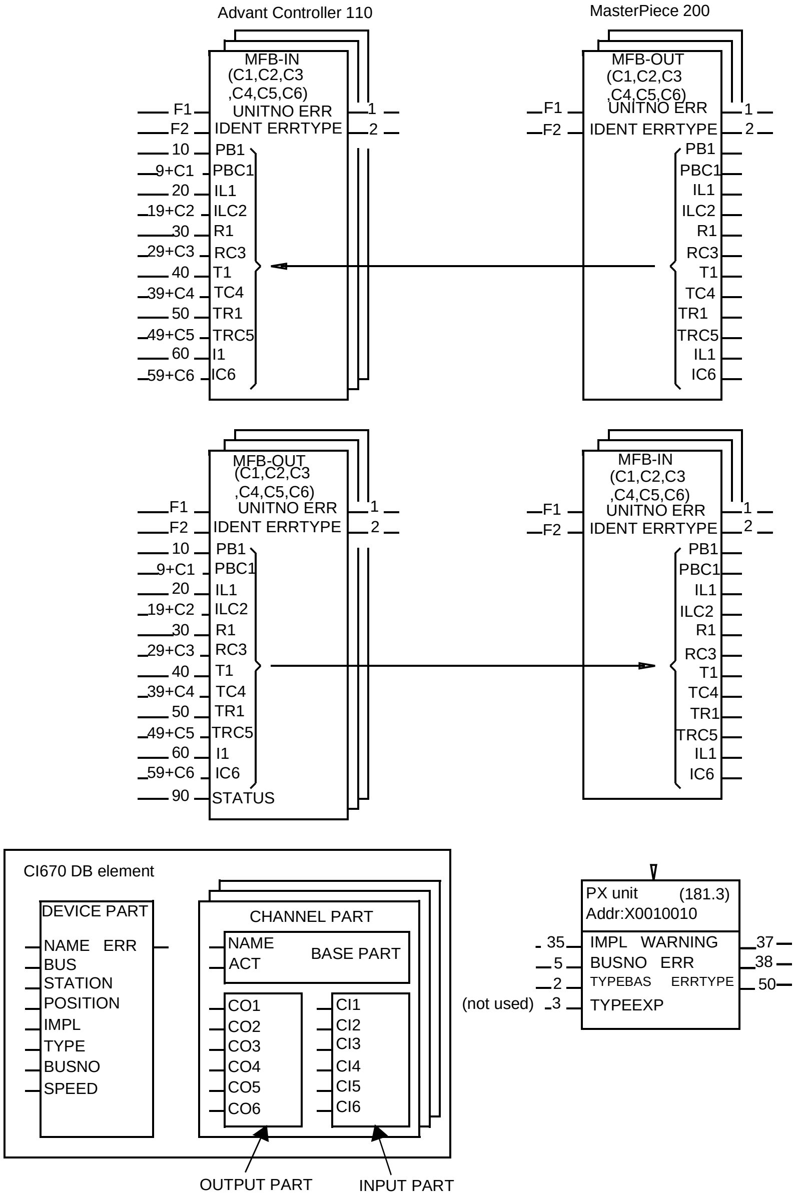


Figure 3-51. DB and PC elements on AC 110 and MasterPiece 200/1

3.13 CI671

Summary

The module CI671 is a communication module (master) for the MasterFieldbus. It is used to connect peripheral devices of type TYRAK-L via MasterFieldbus to the Advant Controller 110. On the MasterFieldbus, the CI671 acts as a bus master.

The MasterFieldbus can be connected to the CI671 in three different ways: Galvanic insulated, non-insulated, non-insulated with two redundant channels.

Main functions of the CI671 are:

- Bus master of the MasterFieldbus
- Sending and receiving of process data
- Supervision

Associated data base elements

Associated data base element is CI671 for the module. For each slave node, a data base element TYRAK_L is needed.

The data transfer via the MasterFieldbus has to be organized using the PC elements COM-CVI1 and COM-CVO1.

Module replacement

On-line replacement possible, but the whole MasterFieldbus will be down when the communication module is removed. No jumpering or adjustments required.

Technical data

Table 3-18. CI671 Technical data

Communication Module	CI671
Communication connection	EIA 485 with passive terminating, short-circuit proof, isolated and non-isolated
Max. number of slave nodes	16
Connector type	Standard process connector TF620
Cable for SDB	According to SDB-cable specification in the manual *MasterFieldbus and S400 I/O*.
Current consumption - typ. (1) - max. (2)	 154 mA 305 mA
Power dissipation - typ. (3) - max. (4)	 3.7 W 5.5 W

(1) Typical consumption from electronic power supply USA/USB.
(2) Max. consumption from electronic power supply USA/USB at min. supply voltage.
(3) Total power dissipation at rated supply voltage.
(4) Total power dissipation at max. supply voltage.

Front view

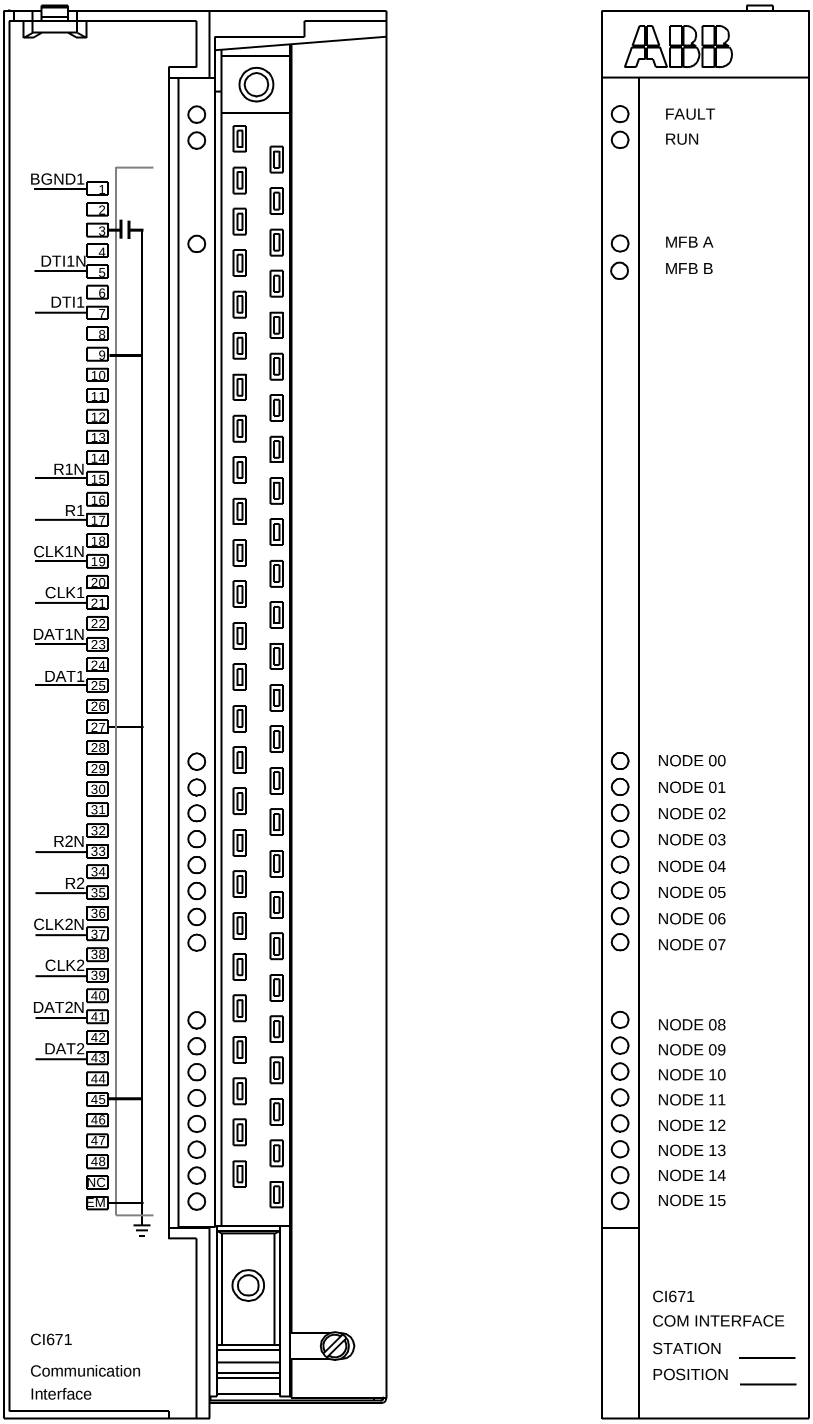


Figure 3-52. CI671 Front view

Connections

Table 3-19. CI671 Connections via process connector TF620

Screw terminal	Signal	Meaning	Interface
1	BGND1	Resistance 120 Ω to signal ground	GSIF (not used)
3		Connection to chassis over a HF/HV capacitor for SDB cable shield	GSIF
5	DTI1N	SDB-Signal (data return)	GSIF
7	DTI1	SDB-Signal (data)	GSIF
9		Connection directly to chassis for SDB cable shield	GSIF (not used)
15	R1N	SDB-Signal (transmission direction return)	NGIF-A
17	R1	SDB-Signal (transmission direction)	NGIF-A
19	CLK1N	SDB-Signal (clock return)	NGIF-A
21	CLK1	SDB-Signal (clock)	NGIF-A
23	DAT1N	SDB-Signal (data return)	NGIF-A
25	DAT1	SDB-Signal (data)	NGIF-A
27		Connection directly to chassis for SDB cable shield	NGIF-A
33	R2N	SDB-Signal (transmission direction return)	NGIF-B
35	R2	SDB-Signal (transmission direction)	NGIF-B
37	CLK2N	SDB-Signal (clock return)	NGIF-B
39	CLK2	SDB-Signal (clock)	NGIF-B
41	DAT2N	SDB-Signal (data return)	NGIF-B
43	DAT2	SDB-Signal (data)	NGIF-B
45		Shield connection directly to chassis for SDB cable shield	NGIF-B

GSIF:	Galvanic Separated Interface	(SDB-A)
NGIF-A:	Not Galvanic Separated Interface A	(SDB-A)
NGIF-B:	Not Galvanic Separated Interface B	(SDB-B)

Bus termination is built-in for all three interfaces.

Functional description

The module CI671 is a communication module (master) for MasterFieldbus. It is used to connect peripheral devices of type TYRAK-L via MasterFieldbus to the Advant Controller 110. On the MasterFieldbus, the CI671 acts as a bus master. Up to 16 slave nodes TYRAK-L may be connected to the bus.

The CI671 offers three possibilities for connecting the MasterFieldbus:

- Galvanic separated interface (GSIF)
- Not galvanic separated interface (NGIF-A)
- Not galvanic separated interface with two redundant channels (NGIF-A and NGIF-B).

Main functions of the CI671 are:

- Bus master of the MasterFieldbus
- Sending and receiving of process data
- Supervision

A detailed description of the MasterFieldbus, including installation guidelines, is given in the manual *MasterFieldbus and S400 I/O.*

There are nineteen LEDs on the front of the module.

Table 3-20. CI671, meaning of LEDs

LEDs	Meaning
FAULT (red)	Indicates module errors
RUN (green)	Indicates operation of the module
MFB A (green)	Indicates active interface NGIF-A
MFB B (green)	Indicates active interface NGIF-B
NODE 00 (yellow) .. NODE 15 (yellow)	16 LEDs indicating the state of up to 16 MasterFieldbus nodes. Each LED can indicate three different states: Dark: Node is not configured; Flashing: Node is configured, but no valid data has been received from the slave node since approximately one second; Lit: Node is configured and valid data is received from the slave node.

An Advant Controller 110 may have up to 4 communication modules CI671, each for connecting the AC 110 station to a different MasterFieldbus. Like an I/O module, the CI671 can be located on position 2 to 20 of a base station or I/O station.

Galvanic separated interface (GSIF)

- Connection to MasterFieldbus SDB (Short-Distance Bus)
- Maximum length of 150 meters
- Maximum ground potential difference of ±50V
- Transmission speed 375 kBaud (fixed)
- Redundancy not possible
- Connection of LDBs via modem not possible

Not galvanic separated interface (NGIF-A)

- Connection to MasterFieldbus SDB (Short-Distance Bus)
- Maximum length of 25 meters
- Maximum ground potential difference of ±7V
- Transmission speed 375 kBaud or 2 MBaud
- Redundancy possible (see below)
- Connection of LDBs via modem possible
  Long-Distance Buses (LDBs) connected via modems to NGIF-A may reach a length of 3000 meters using optical fiber and 750 meters using coaxial cable.
  It‘s not possible to connect two LDBs in series with intermediate SDBs.
  A maximum of 10 modems can be connected to a LDB.

Not galvanic separated interface with two redundant channels (NGIF-A and NGIF-B)

- Connection to MasterFieldbus SDB (Short-Distance Bus)
- Same characteristics as with NGIF-A
- For redundancy, two SDBs, designated SDB-A and SDB-B, are connected to NGIF-A and NGIF-B. The bus master CI671 polls the slave nodes at regular intervals via SDB-A or SDB-B. The switch-over time between both SDBs is adjustable at the data base element CI671.

Bus master of the Master Fieldbus

After insertion or power-on, the CI671 is in its passiv state. In this state, no polling is done and no process data is transferred to or from the MasterFieldbus.

After the CPU has activated the CI671 (communication module is set to operation and the green LED RUN is lit), the CI671 will poll the slave nodes. For each slave node to be polled, there must be a corresponding data base element TYRAK_L.

Sending and receiving of process data

When the CI671 is activated, it will send and receive process data to and from the MasterFieldbus.

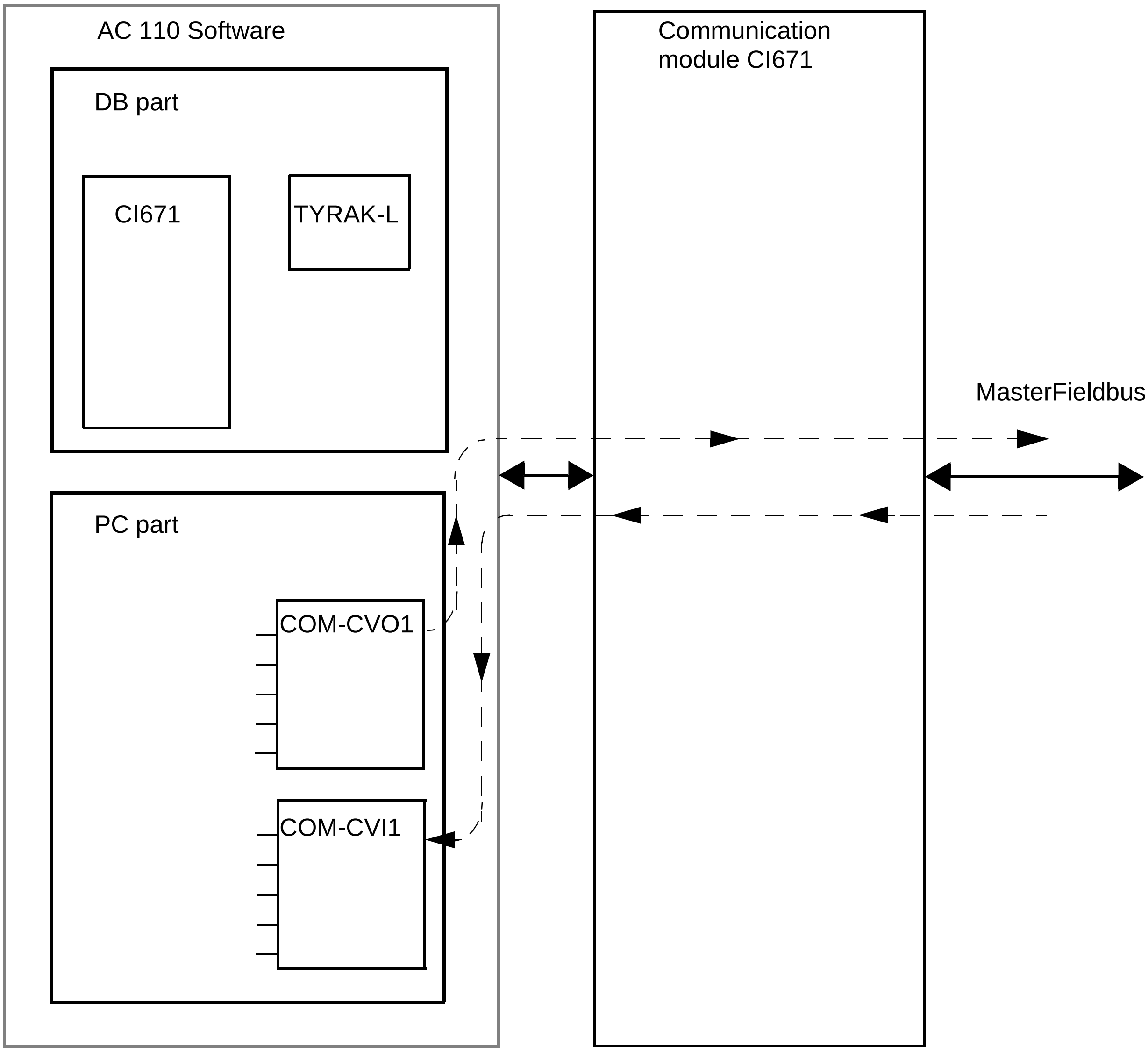


Figure 3-53. CI671 Principle of data transfer

Data exchange on MasterFieldbus is maintained by PC elements COM-CVO1 and COM-CVI1. For sending data to a slave node, there is a COM-CVO1. For receiving data from a slave node, there is a COM-CVI1.

So for each slave node of type TYRAK-L, you need exactly one data base element TYRAK_L, one PC element COM-CVO1 and one PC element COM-CVI1.

If there is no COM-CVO1, empty data frames are transmitted to the corresponding slave node instead.

Please refer to the manuals *PC Elements Advant Controller 100 Series* and *Data Base Elements Advant Controller 100 Series* for more details.

Supervision

When the supervision function of the CI671 detects an error, it will act as follows:

- Low power supply voltage
  Green LED RUN off, red LED FAULT on.
  Module is in its passive state.
- Fatal hardware error
  Green LED RUN off, red LED FAULT on,
  ERR attribute of data base element CI671 set.
- Front connector removed
  Green LED RUN off,
  ERR attribute of data base element CI671 set.
- Error on the MasterFieldbus
  ERR attribute of data base element CI671 set,
  ERR terminal and ERRTYPE terminal of PC element COM-CVI1 or COM-CVO1 set.
  (Please refer to the manual *PC Elements Advant Controller 100 Series* for more details.)

MasterFieldbus, configuration with communication module CI671

Figure 3-54 shows an example of a MasterFieldbus configuration including Advant Controller 110 with communication module CI671 as bus master.

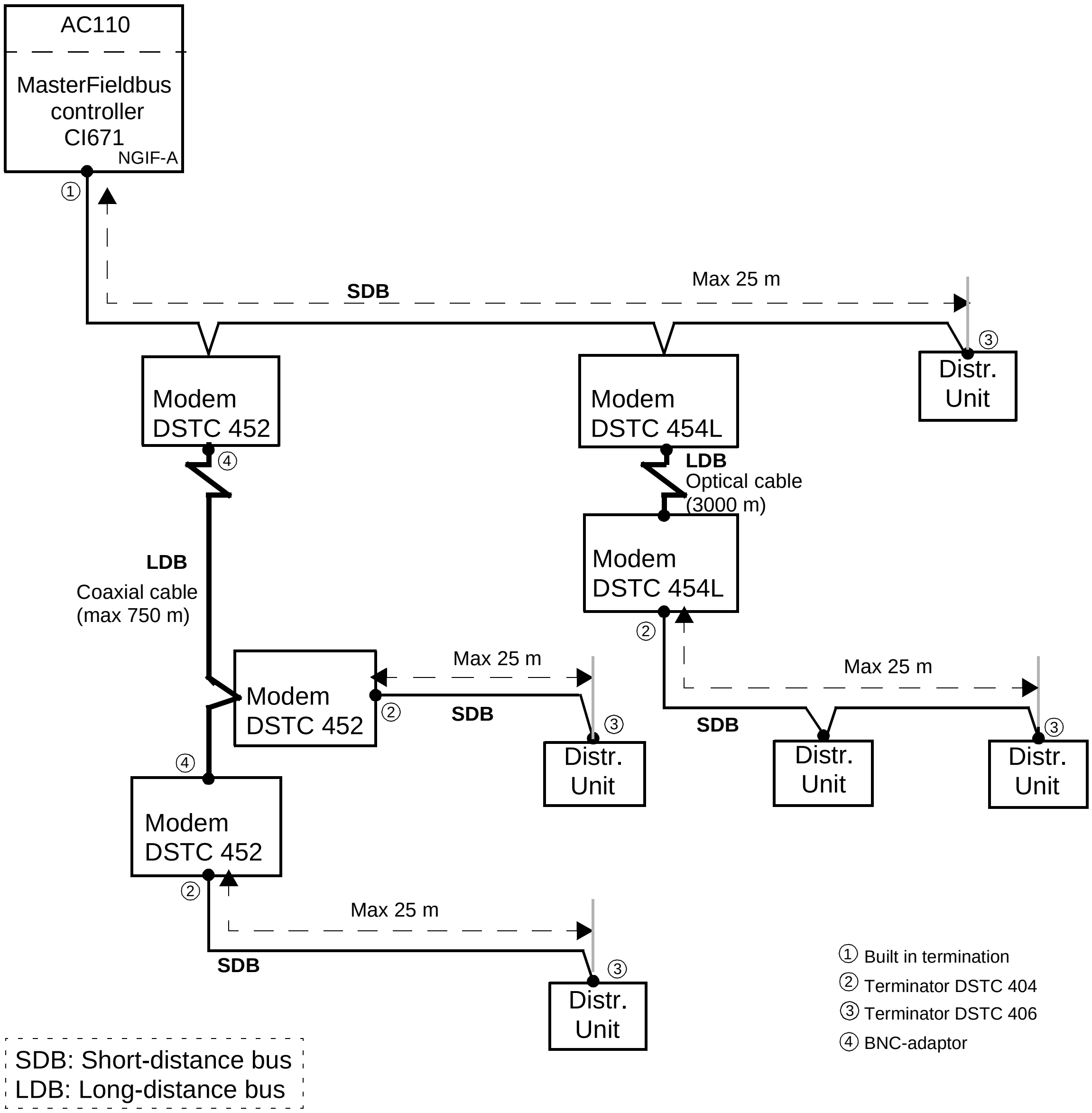


Figure 3-54. Advant Controller 110 connection to MasterFieldbus via CI671

Communication with COM-CVO1 and COM-CVI1

The figure below shows the data flow between Advant Controller 110 and remote units at the PC/DB elements level.

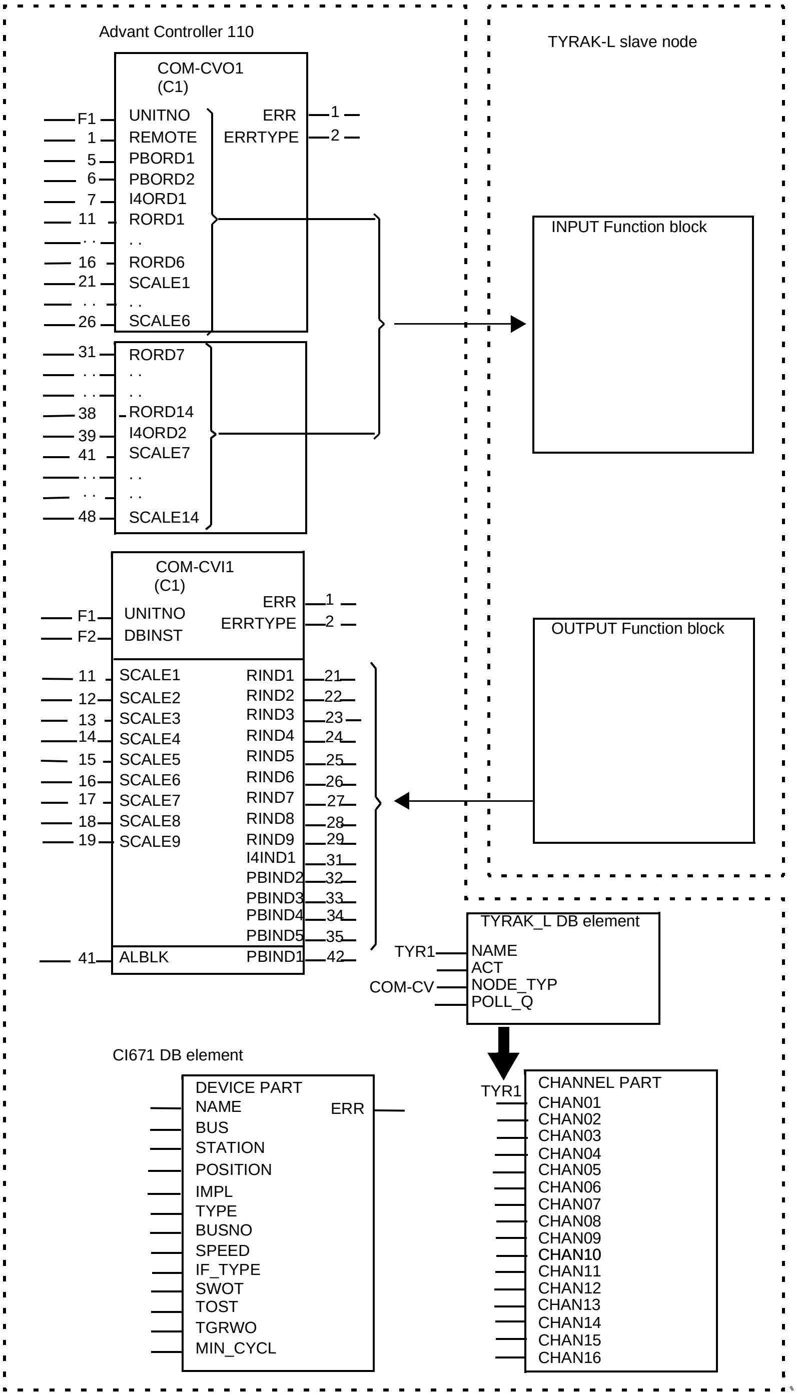


Figure 3-55. DB and PC elements for CI671

]

3.14 DI610

Summary

The digital input module DI610 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 32 non-isolated channels for 24 V DC.

Associated data base elements

Associated data base elements are DI610 for the module and DIS610 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-21. DI610 Technical data

Digital Input	DI610
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 24 V DC -30 to +5 V DC +13 to +30 V DC
Input current typ.	8.3 mA
Time delay typ.	11 ms
Cable length, max.	1000 m
Isolation	no
Monitoring inputs for UP	1
Current consumption - typ.(1) - max.(2)	 20 mA 33 mA
Power dissipation - typ.(3) - max.(4)	 7.1 W 13 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

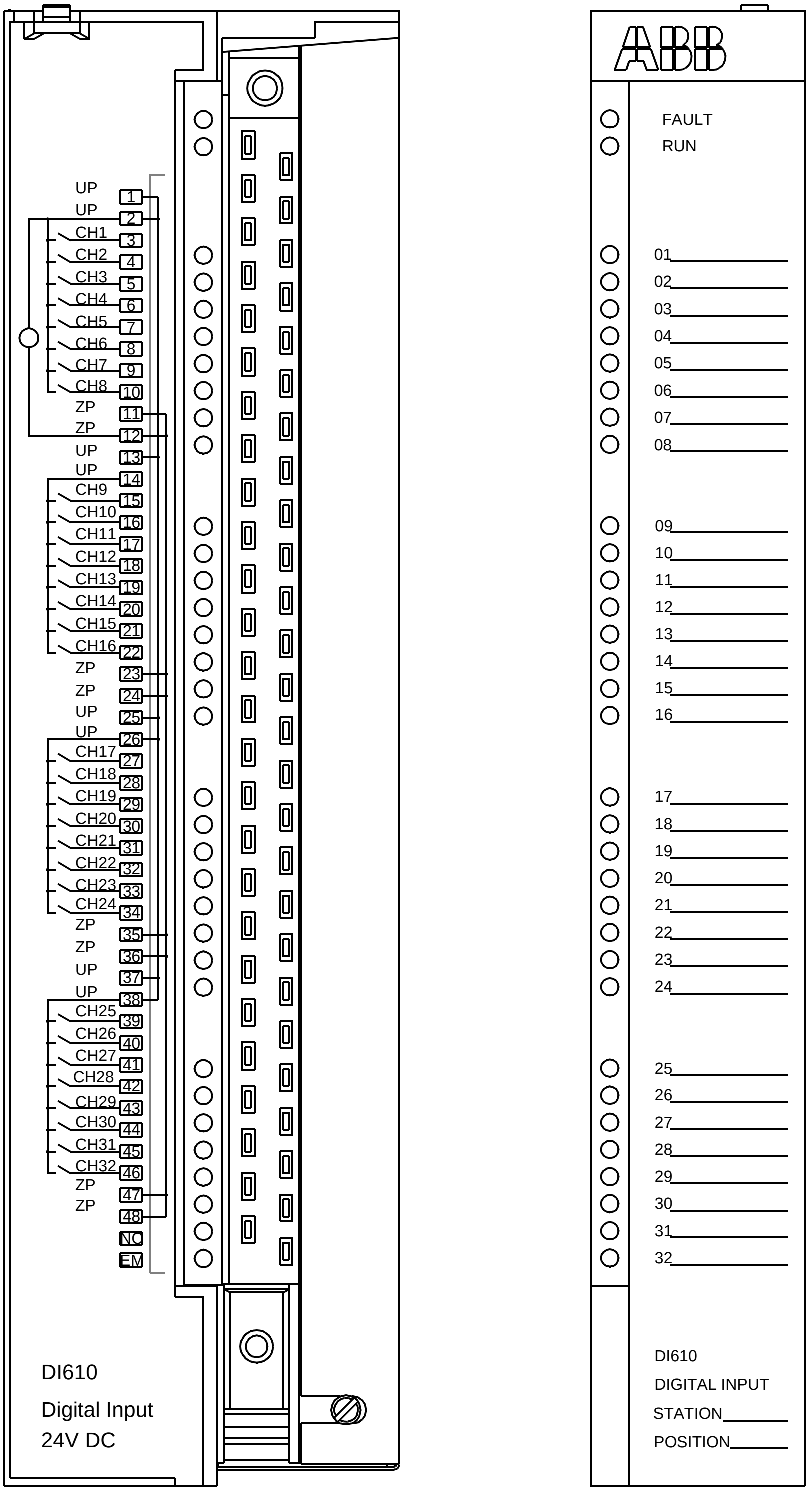


Figure 3-56. DI610 Front view

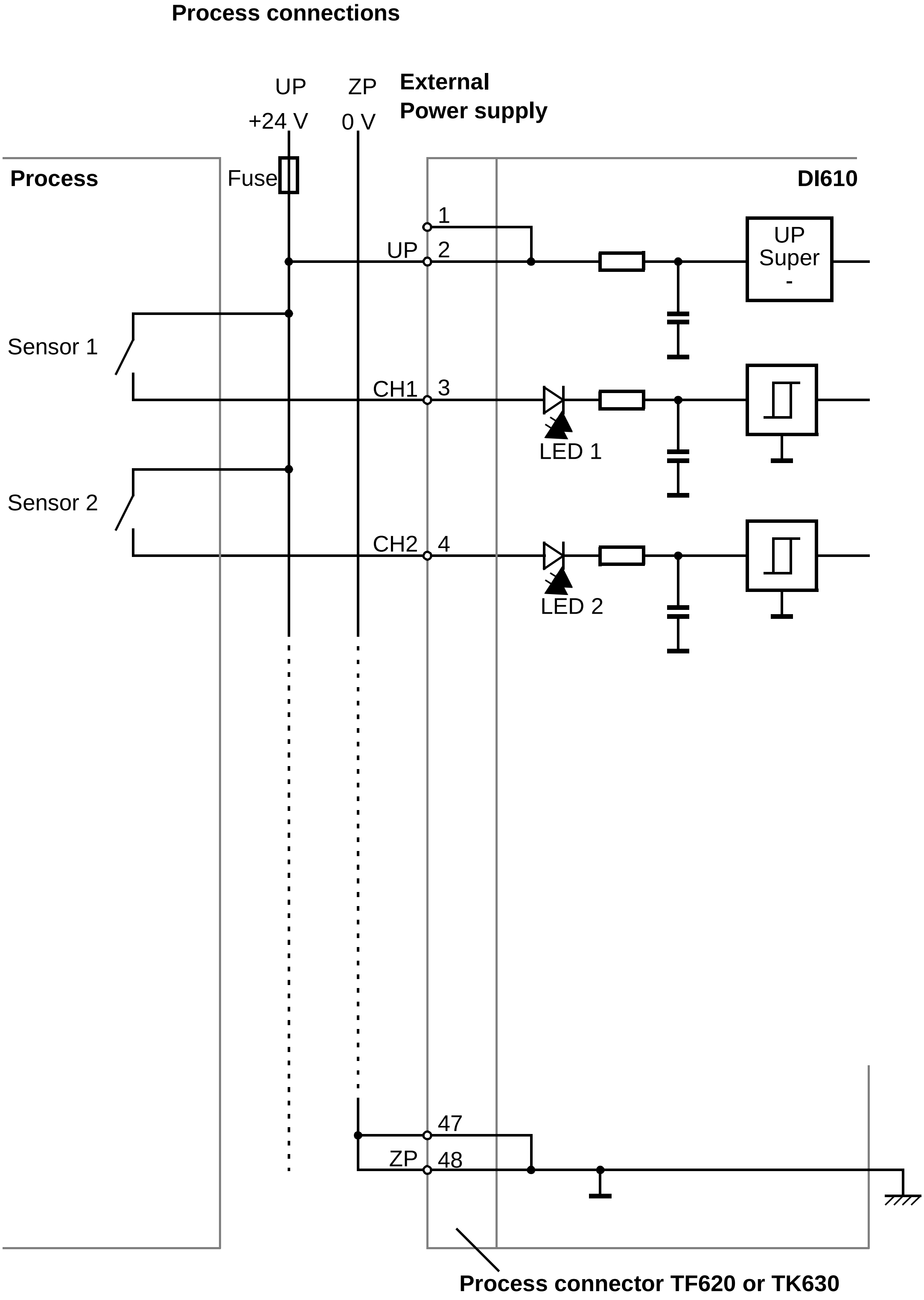


Figure 3-57. DI610, example of process connections

Functional description

The digital input module DI610 has 32 non-isolated input channels for 24 V. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

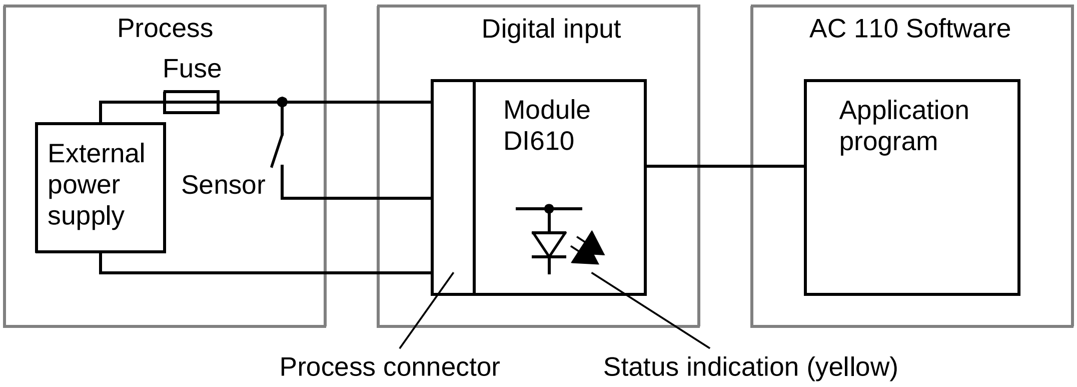


Figure 3-58. DI610 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI610 are designed for 24 V input signals. The typical input current of each channel is 8.3 mA. The input circuits must be supplied by an external 24 V DC process voltage. The process voltage and electronic power supply are not isolated, i.e., the two grounds are galvanically connected.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI610 is fixed.

3.15 DI620

Summary

The digital input module DI620 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 32 channels for 24 V DC, isolated by opto-couplers.

Associated data base elements

Associated data base elements are DI620 for the module and DIS620 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-22. DI620 Technical data

Digital Input	DI620
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 24 V DC -30 to +5 V +13 to +30 V
Input current typ.	8.3 mA
Time delay typ.	8 ms
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 500 V rms
Monitoring inputs for UP	4
Current consumption - typ.(1) - max.(2)	 24 mA 42 mA
Power dissipation - typ.(3) - max.(4)	 7.8 W 11.8 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

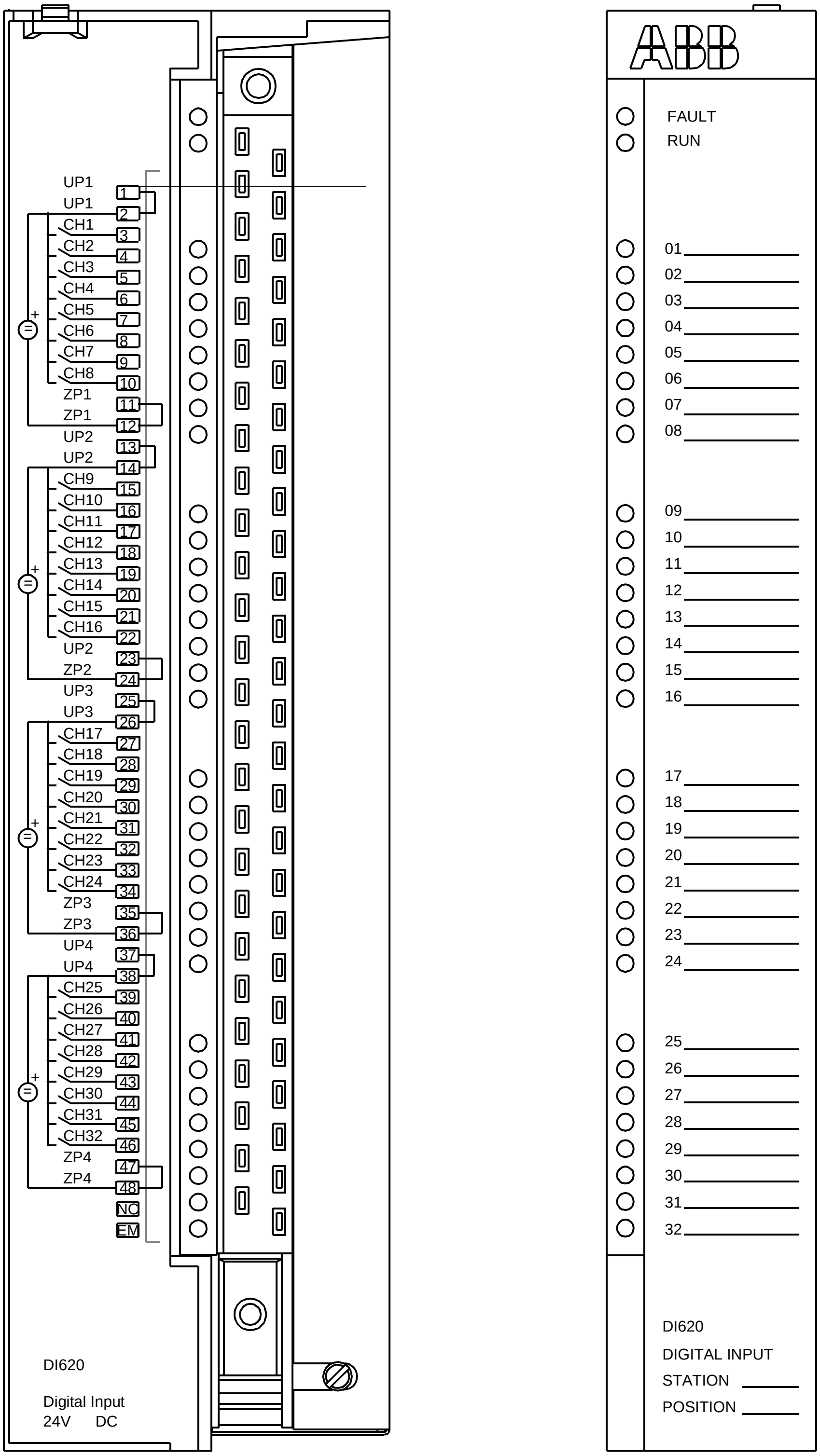


Figure 3-59. DI620 Front view

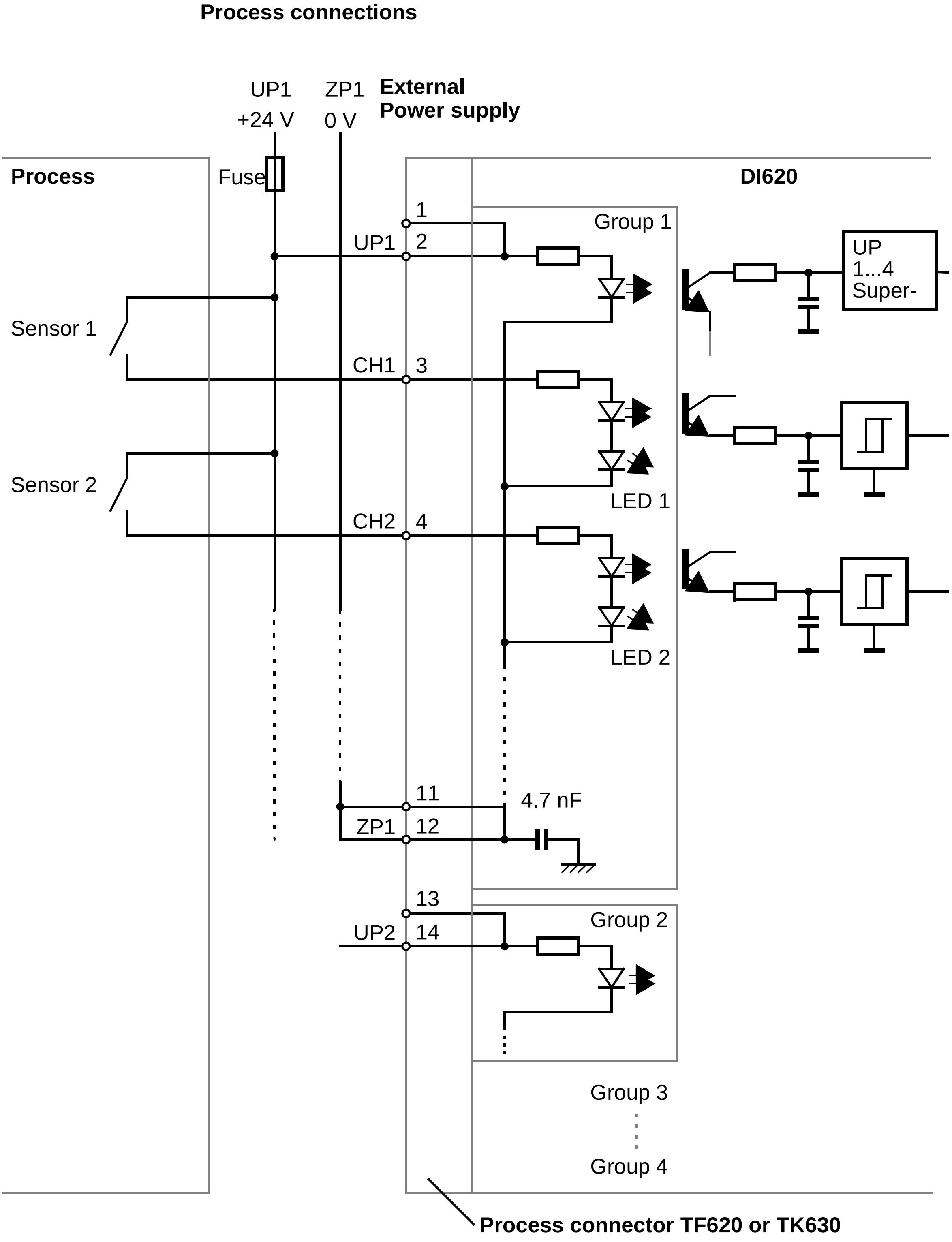


Figure 3-60. DI620, example of process connections

Functional description

The digital input module DI620 has 32 input channels for 24 V, isolated in 4 groups per 8 signals by opto couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

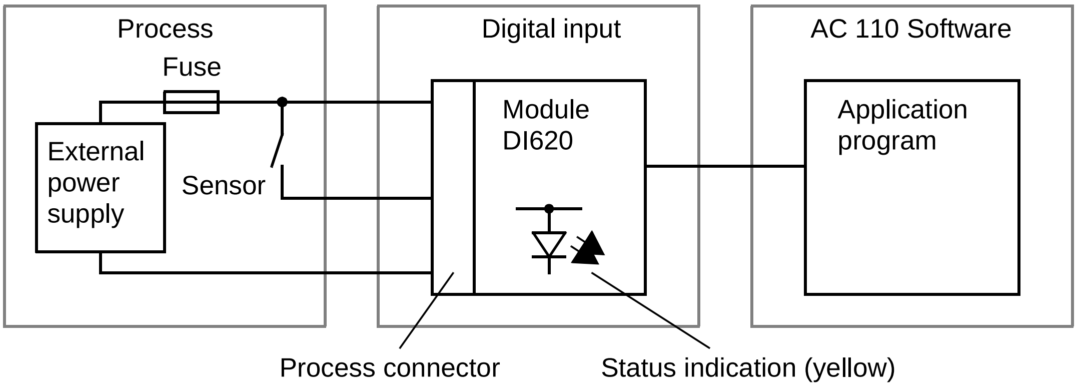


Figure 3-61. DI620 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI620 are designed for 24 V input signals. The typical input current of each channel is 8.3 mA. The input circuits must be supplied by an external 24 V DC process voltage.

The input module DI620 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI620 is fixed.

3.16 DI621

Summary

The digital input module DI621 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 32 channels for 48 V DC, isolated by opto-couplers.

Associated data base elements

Associated data base elements are DI621 for the module and DIS621 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-23. DI621 Technical data

Digital Input	DI621
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 48 V DC -60 to +10 V +30 to +60 V
Input current typ.	5 mA
Time delay typ.	8 ms
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 500 V rms
Monitoring inputs for UP	4
Current consumption - typ.(1) - max.(2)	 24 mA 42 mA
Power dissipation - typ.(3) - max.(4)	 9.2 W 15 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.
(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.
(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.
(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

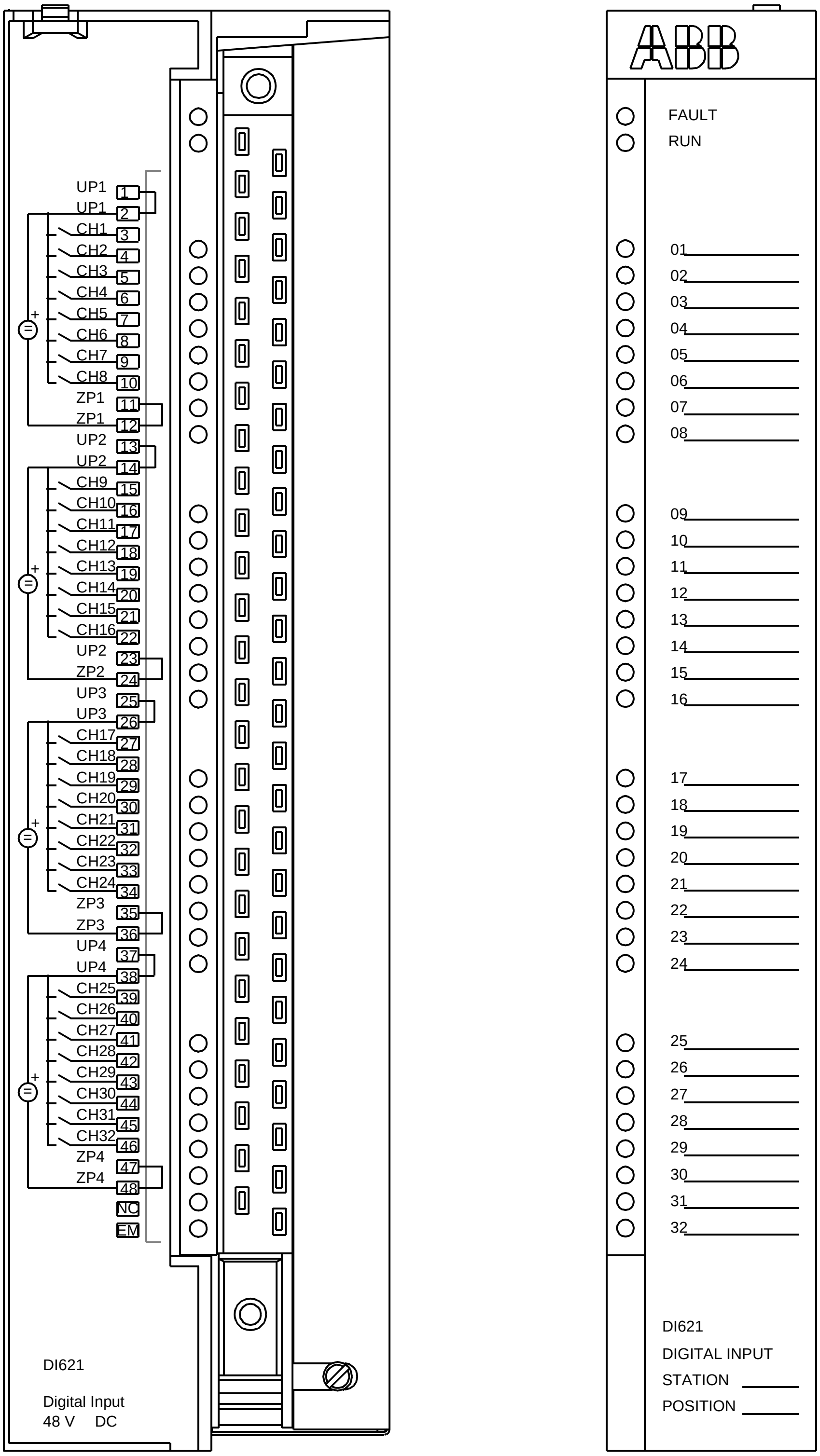


Figure 3-62. DI621 Front view

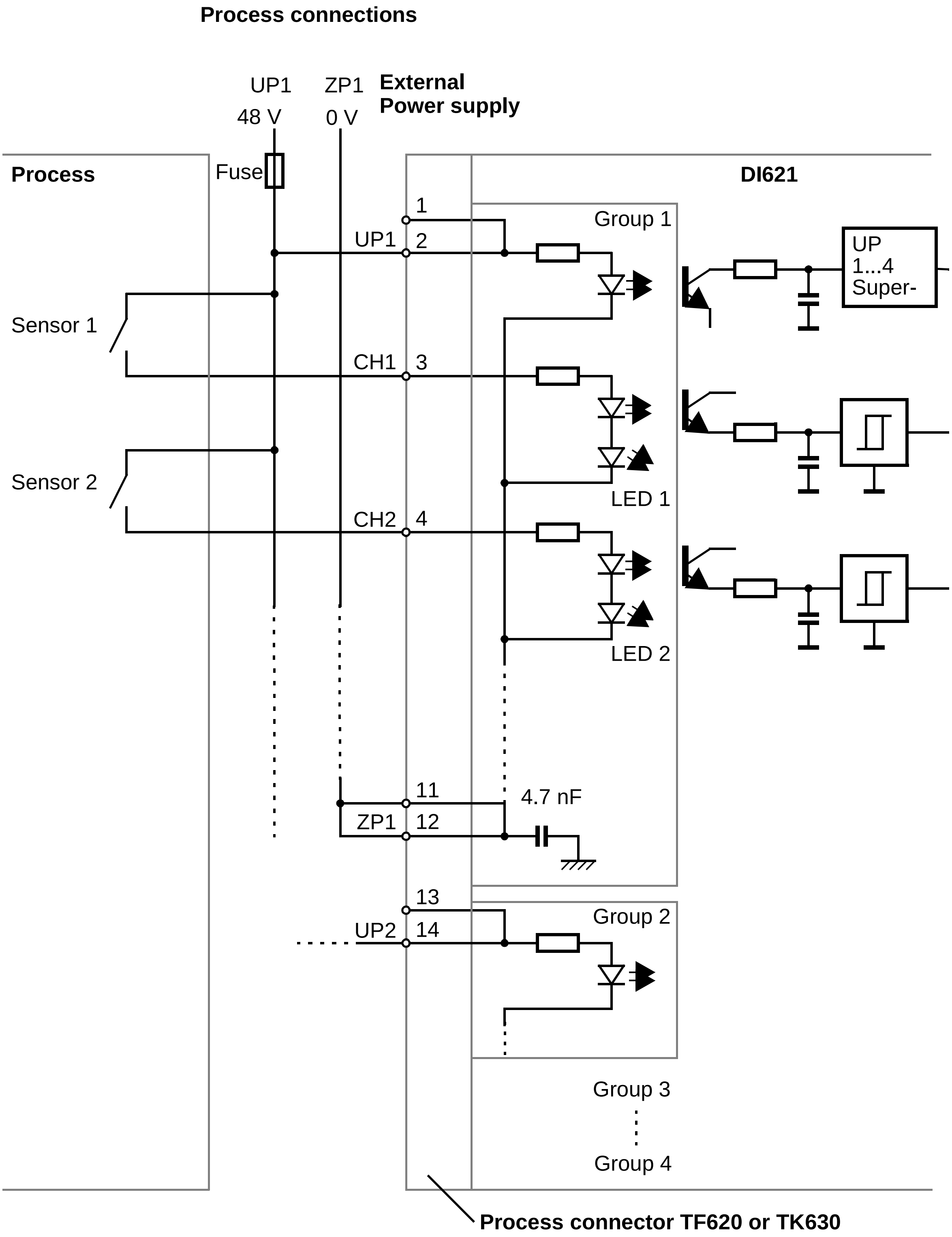


Figure 3-63. DI621, example of process connections

Functional description

The digital input module DI621 has 32 input channels for 48 V DC, isolated in 4 groups per 8 signals by opto couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

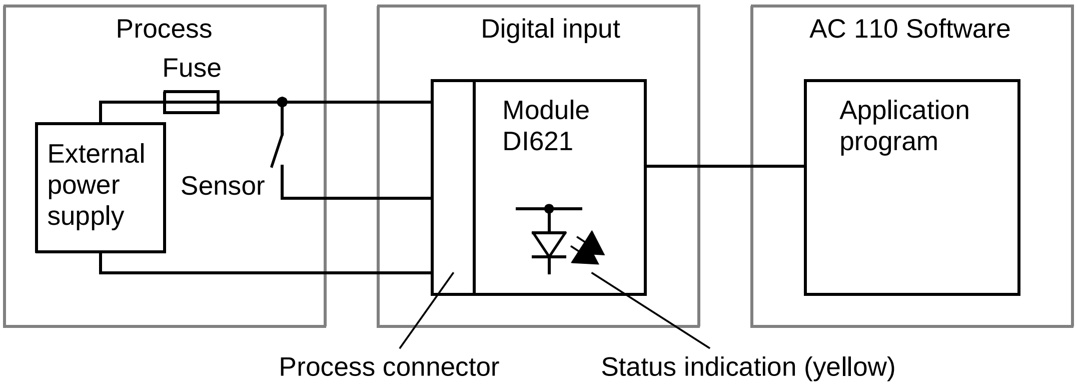


Figure 3-64. DI621 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI621 are designed for 48 V DC input signals. The typical input current of each channel is 5 mA. The input circuits must be supplied by an external 48 V DC process voltage.

The input module DI621 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI621 is fixed.

3.17 DI622

Summary

The digital input module DI622 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 32 channels for 60 V DC, isolated by opto-couplers.

Associated data base elements

Associated data base elements are DI622 for the module and DIS622 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-24. DI622 Technical data

Digital Input	DI622
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 60 V DC -75 to +13 V +37 to +75 V
Input current typ.	4 mA
Time delay typ.	8 ms
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 1800 V rms
Monitoring inputs for UP	4
Current consumption - typ.(1) - max.(2)	 24 mA 42 mA
Power dissipation - typ.(3) - max.(4)	 9.2 W 14 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

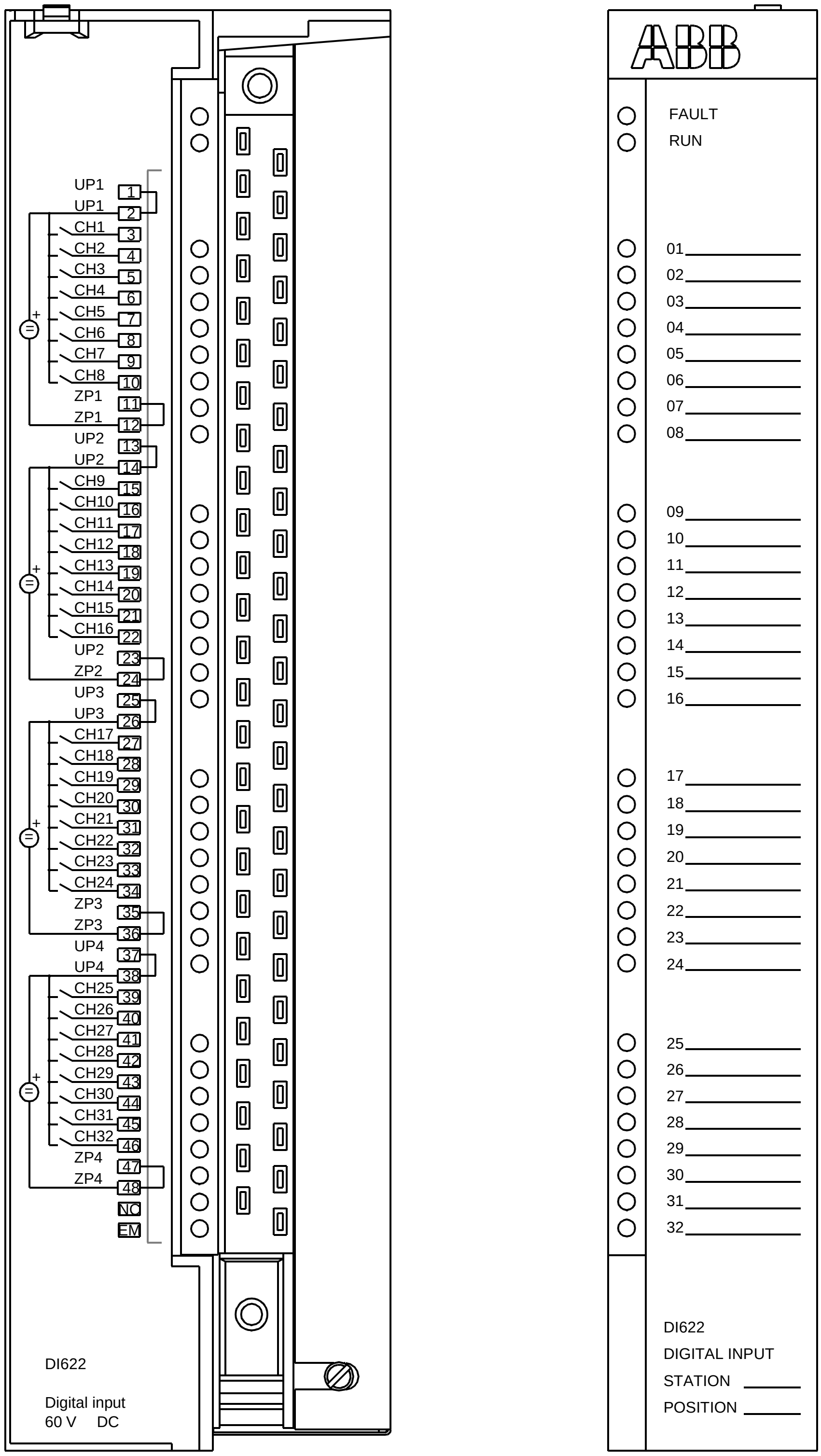


Figure 3-65. DI622 Front view

Process connections

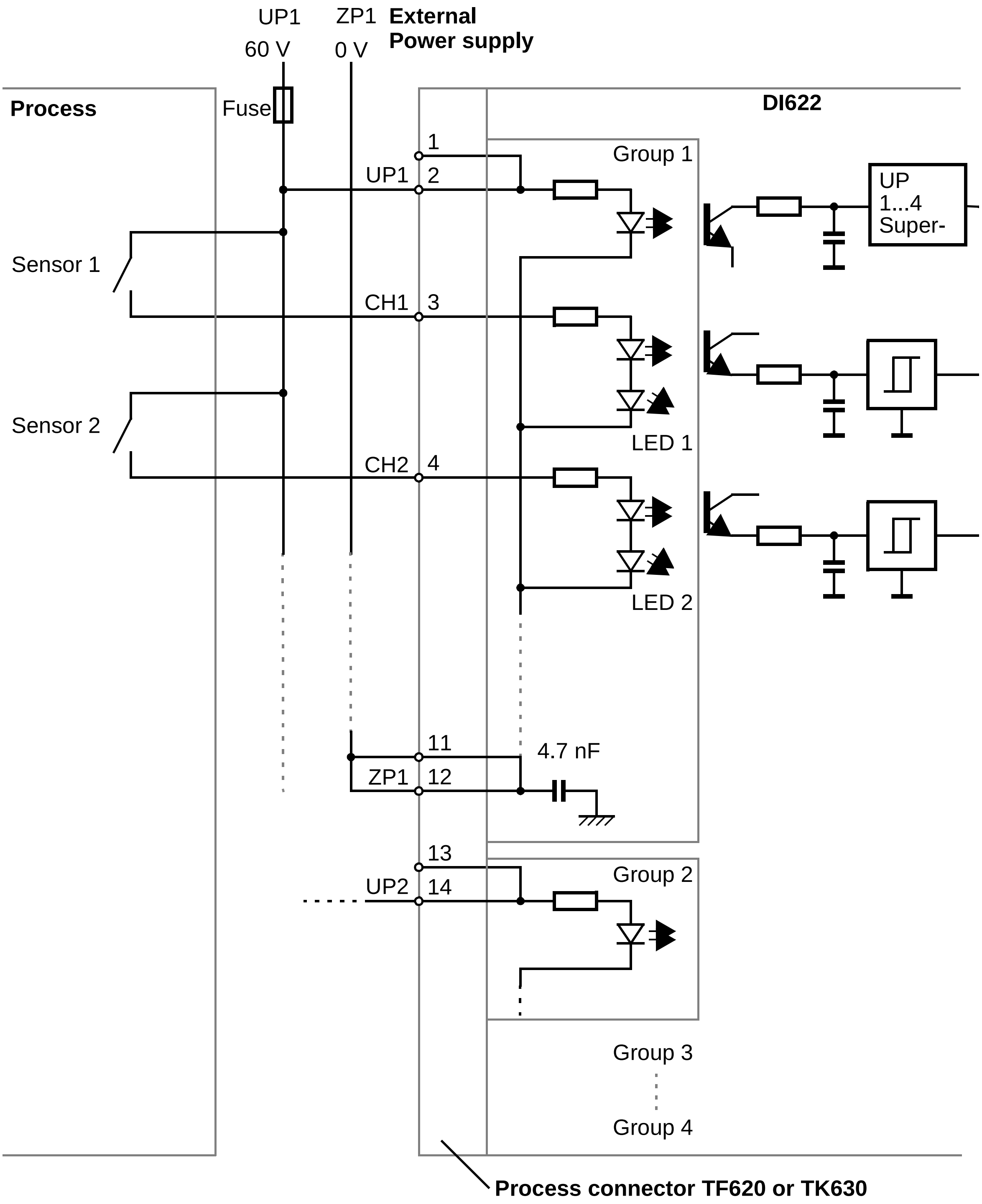


Figure 3-66. DI622, example of process connections

Functional description

The digital input module DI622 has 32 input channels for 60 V DC, isolated in 4 groups per 8 signals by opto couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

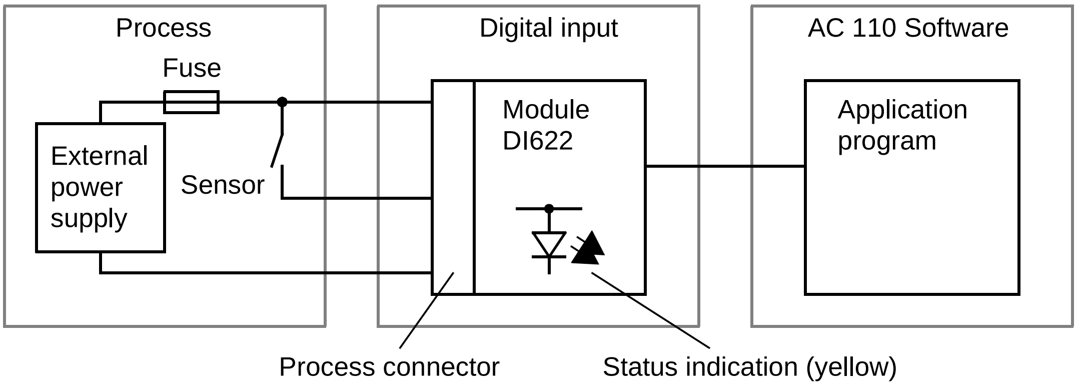


Figure 3-67. DI622 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI622 are designed for 60 V DC input signals. The typical input current of each channel is 4 mA. The input circuits must be supplied by an external 60 V DC process voltage.

The input module DI622 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI622 is fixed.

3.18 DI635

Summary

The digital input module DI635 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 16 channels for 120 V AC, isolated by opto-couplers.

Associated data base elements

Associated data base elements are DI635 for the module and DIS635 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-25. DI635 Technical data

Digital Input	DI635
No. of inputs	16
Input voltage - Rated voltage UP - Frequency - Input voltage range „0“ - Input voltage range „1“	 120 V AC 47 to 63 Hz 0 to 33 V AC 77 to 132 V AC
Input current	5 mA AC
Time delay on/off	8/16 ms
Cable length, max.	240 m
Isolation - in groups per - test voltage	yes, opto 4 2200 V rms
Monitoring inputs for UP	4
Current consumption - typ.(1) - max.(2)	 25 mA 34 mA
Power dissipation - typ.(3) - max.(4)	 8 W 10.8 W
Weight	1.2 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

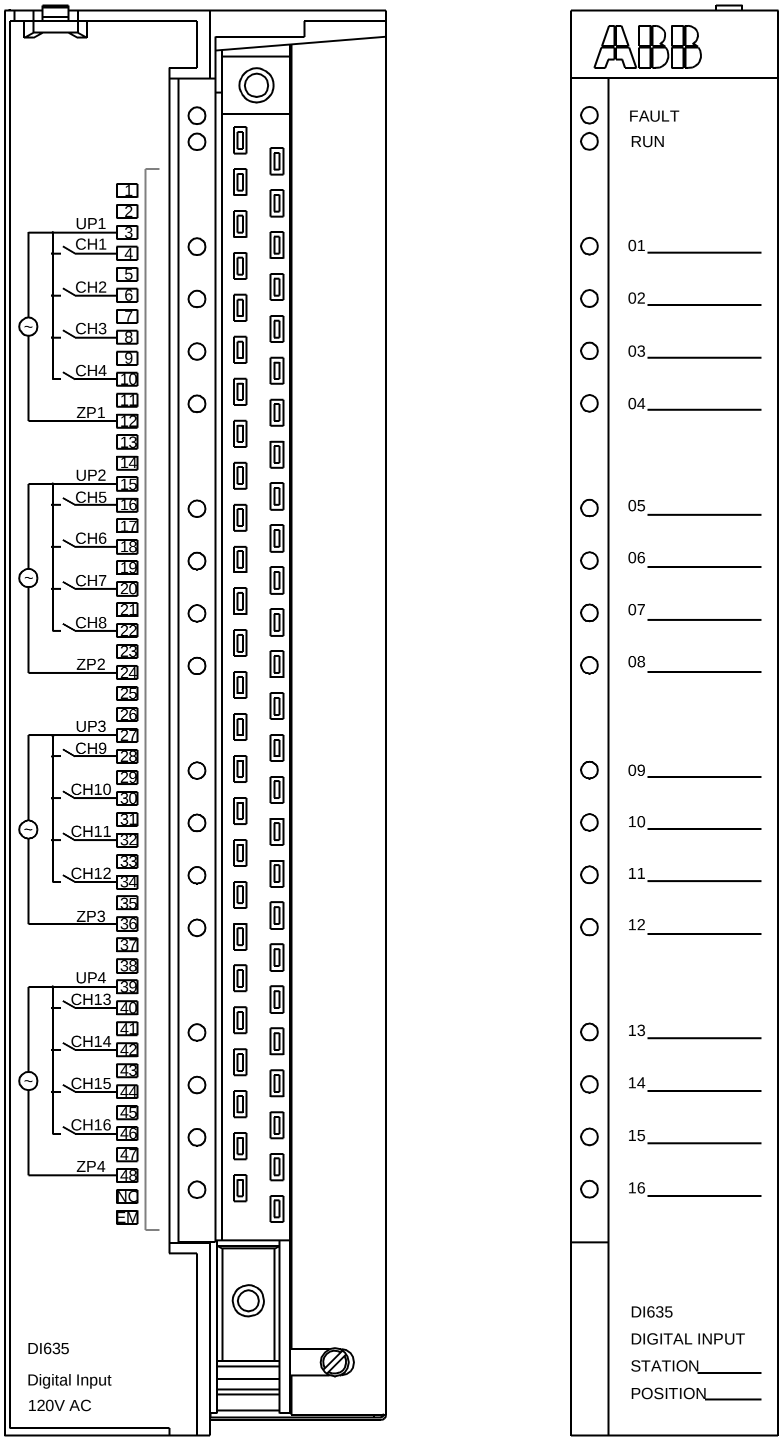


Figure 3-68. DI635 Front view

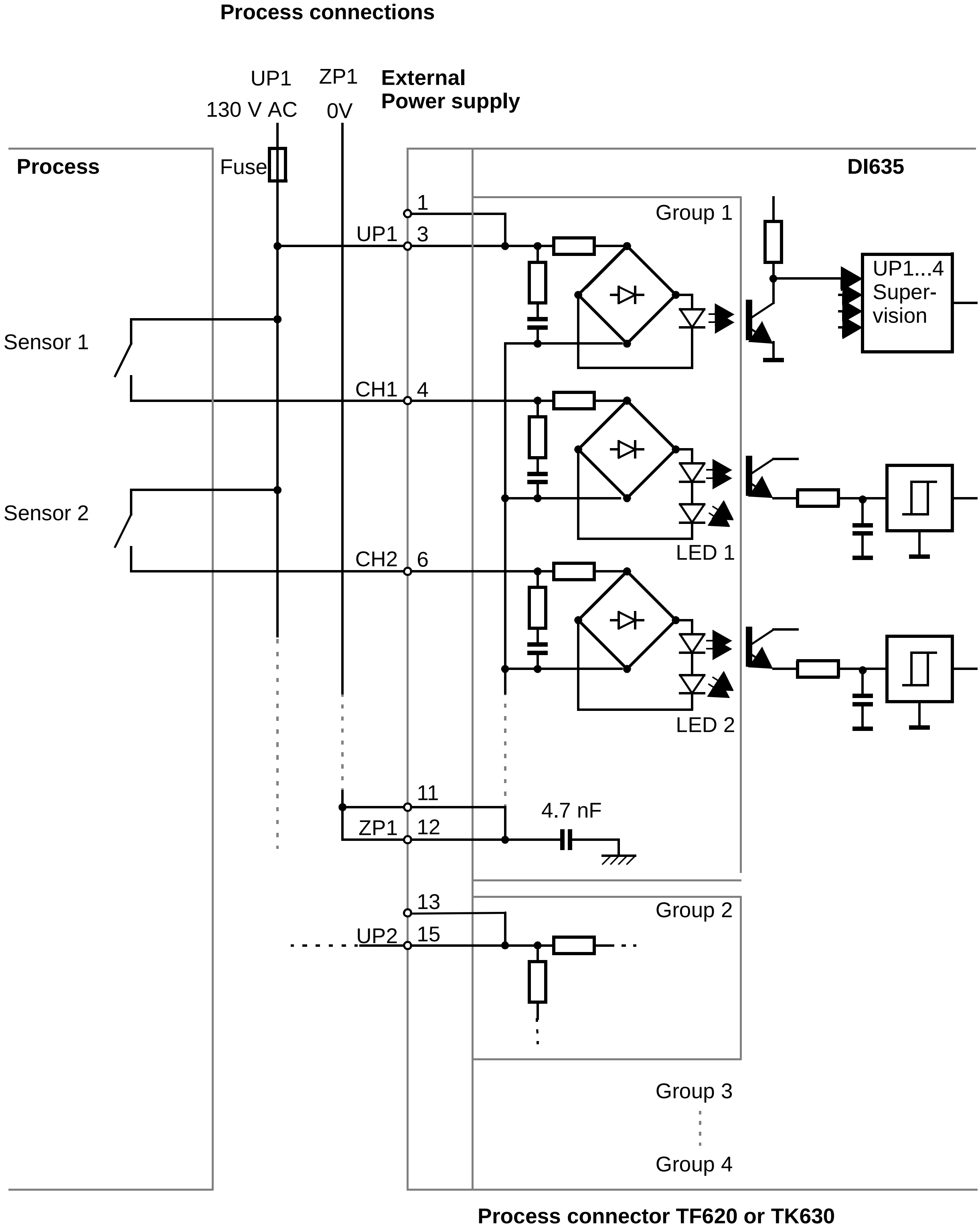


Figure 3-69. DI635, example of process connections

Functional description

The digital input module DI635 has 16 input channels for 120 V AC, isolated in 4 groups per 4 signals by opto couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are eighteen LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining sixteen yellow LEDs.

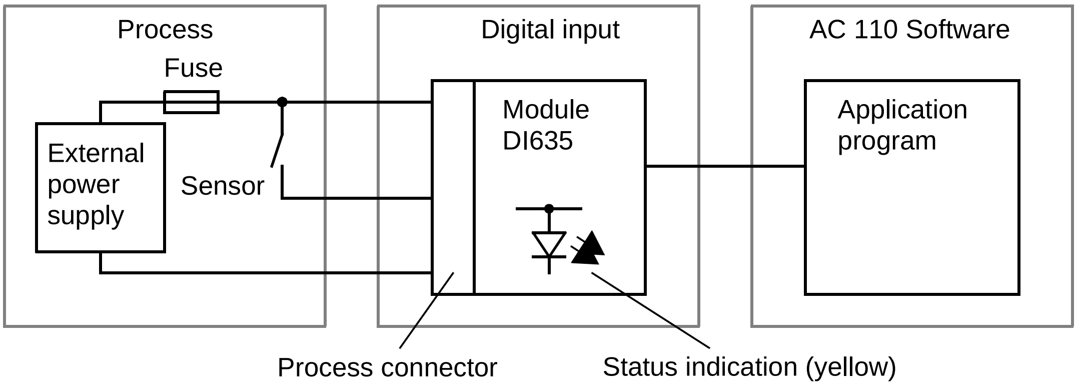


Figure 3-70. DI635 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI635 are designed for 120 V AC input signals. The typical input current of each channel is 5 mA. The input circuits must be supplied by an external 120 V AC process voltage.

The input module DI635 has 16 isolated inputs arranged in four groups of four inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI635 is fixed.

3.19 DI636

Summary

The digital input module DI636 converts the binary signals from the sensors to the internal signal levels required by the programmable controller. It has 16 channels for 230 V AC, isolated by opto-couplers.

Associated data base elements

Associated data base elements are DI636 for the module and DIS636 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-26. DI636 Technical data

Digital Input	DI636
No. of inputs	16
Input voltage - Rated voltage UP - Frequency - Input voltage range „0“ - Input voltage range „1“	 230 V AC 47 to 63 Hz 0 to 66 V AC 164 to 264 V AC
Input current	8 mA AC
Time delay on/off	8/16 ms
Cable length, max.	240 m
Isolation - in groups per - test voltage	yes, opto 4 2200 V rms
Monitoring inputs for UP	4
Current consumption - typ.(1) - max.(2)	 25 mA 34 mA
Power dissipation - typ.(3) - max.(4)	 11 W 16.9 W
Weight	1.2 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(2) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(4) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

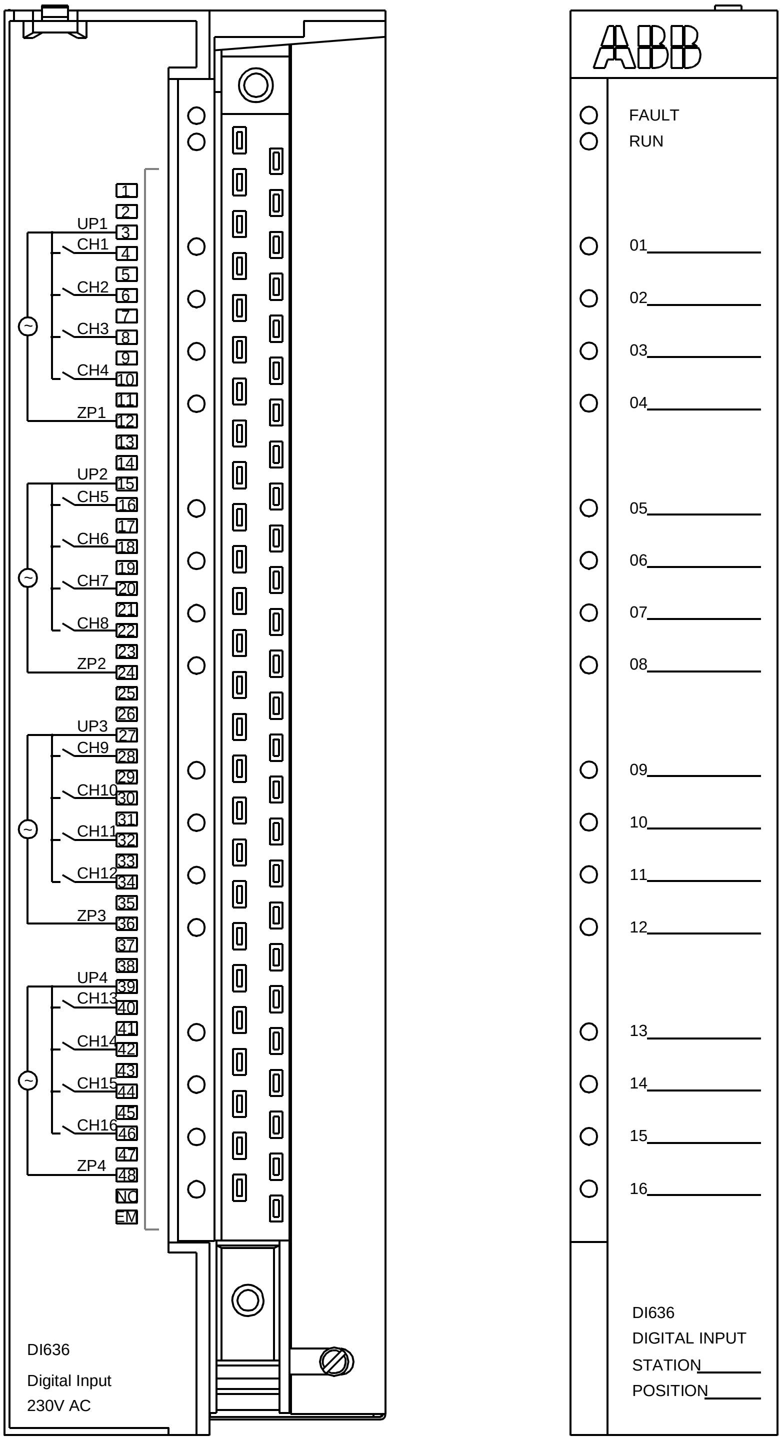


Figure 3-71. DI636 Front view

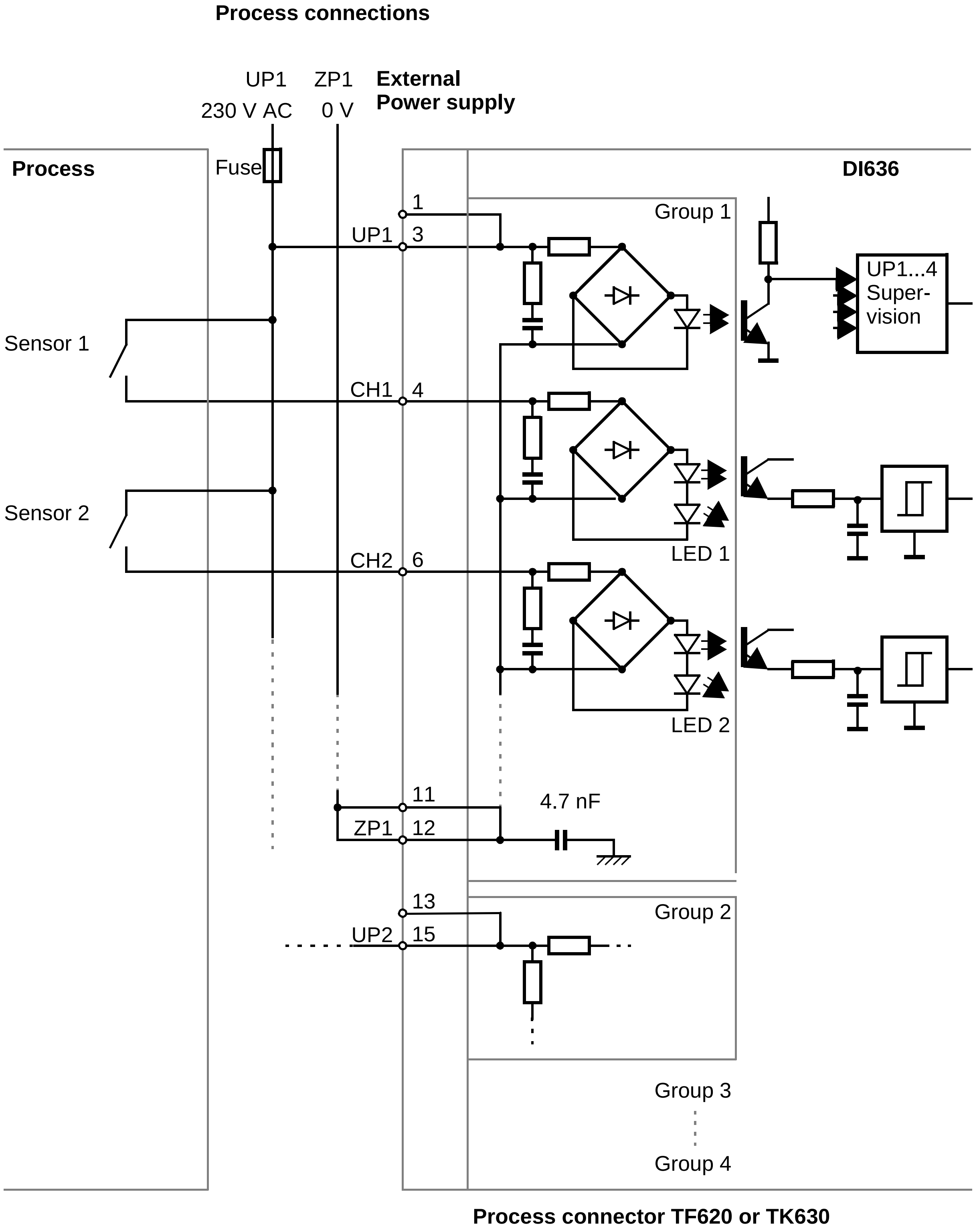


Figure 3-72. DI636, example of process connections

Functional description

The digital input module DI636 has 16 input channels for 230 V AC, isolated in 4 groups per 4 signals by opto couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter.

There are eighteen LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining sixteen yellow LEDs.

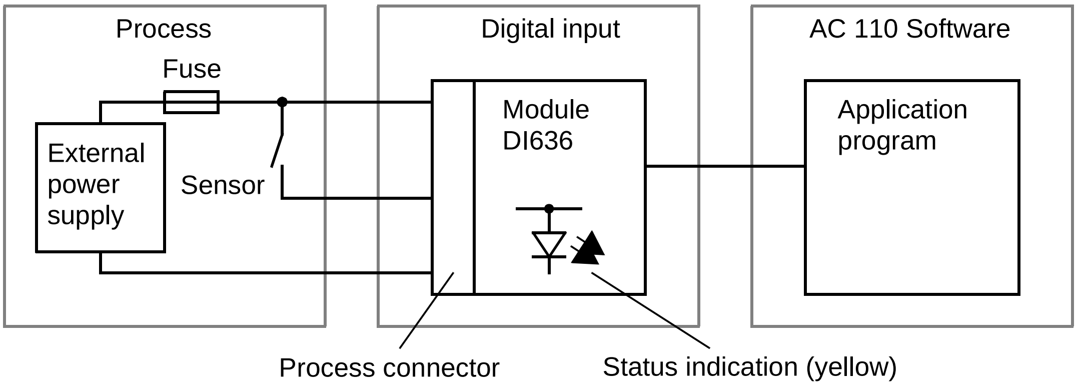


Figure 3-73. DI636 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI636 are designed for 230 V AC input signals. The typical input current of each channel is 8 mA. The input circuits must be supplied by an external 230 V AC process voltage.

The input module DI636 has 16 isolated inputs arranged in four groups of four inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals are filtered in the input module to suppress any electrical interference or contact bounce. The filtering time for all inputs of DI636 is fixed.

3.20 DI650

Summary

The digital input module DI650 converts the binary signals from the sensors to the internal signal levels required by the internal controller. It has 32 channels for 24 V DC, isolated by opto couplers. It can be used in three different modes:

- digital input
- digital input with pulse catching
- digital input with event recording.

Associated data base elements

Associated data base elements are DI650 for the module and DIS650 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-27. DI650 Technical data

Digital Input	DI650
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 24 V DC -30 to +5 V DC +13 to +30 V DC
Input current typ.	8.3 mA
Time delay typ.(1)	selectable 0 to 256 ms
Operating modes	event-recording pulse-catching digital input
Pulse prolongation	bounce filter time ...4000 ms or off
Shutter filter in event-recording mode: recovery time shutter-triggering shutter-period	 0 to 65000 s 0 to 256 changes 0 to 256 s
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 500 V rms
Monitoring inputs for UP	4
Current consumption - typ.(2) - max.(3)	 63 mA 84 mA
Power dissipation - typ.(4) - max.(5)	 7.9 W 12 W
Weight	1.1 kg

(1) For event-recording mode, 0-32 ms. If bounce filter is turned off, use screened cable.
(2) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.
(3) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.
(4) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.
(5) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

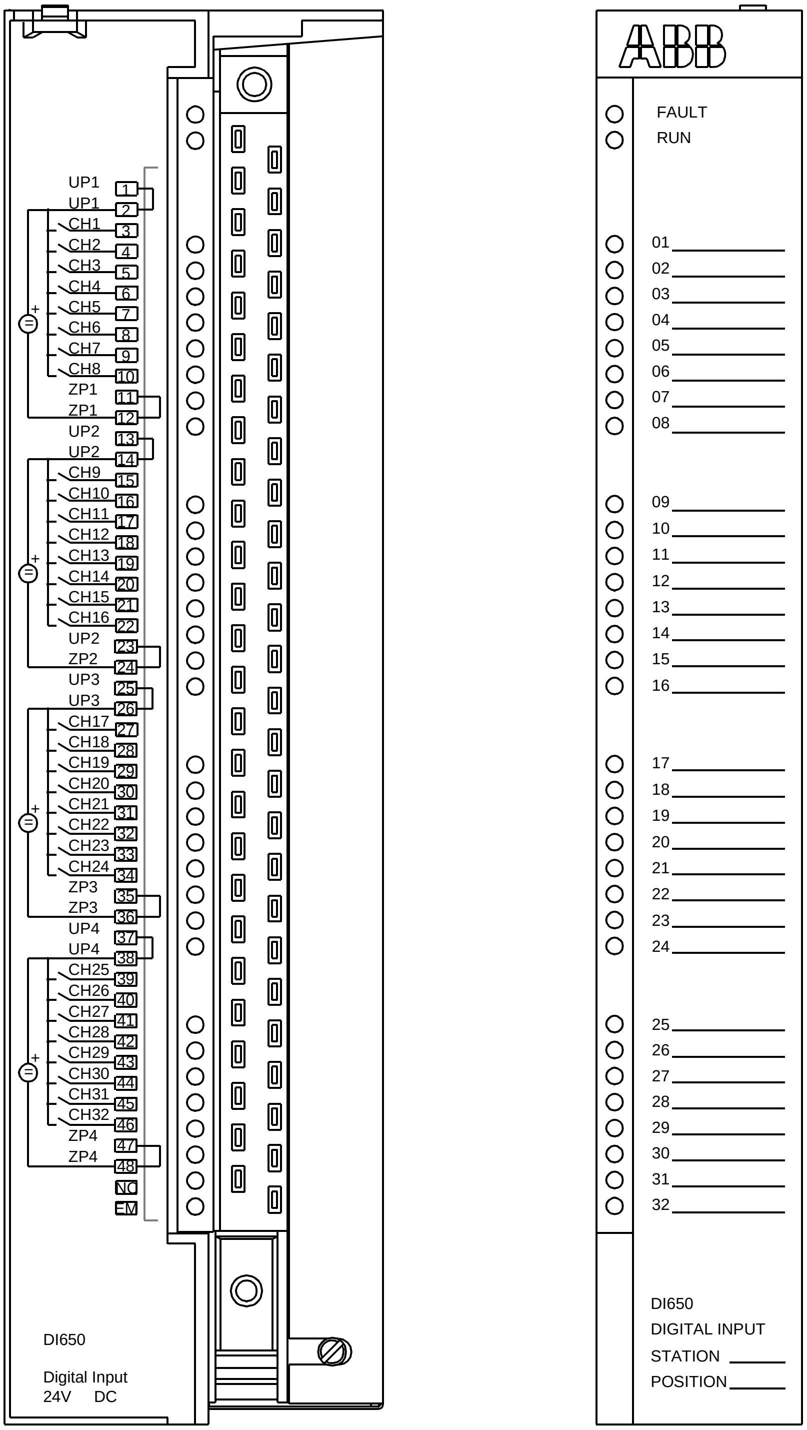


Figure 3-74. DI650 Front view

Process connections

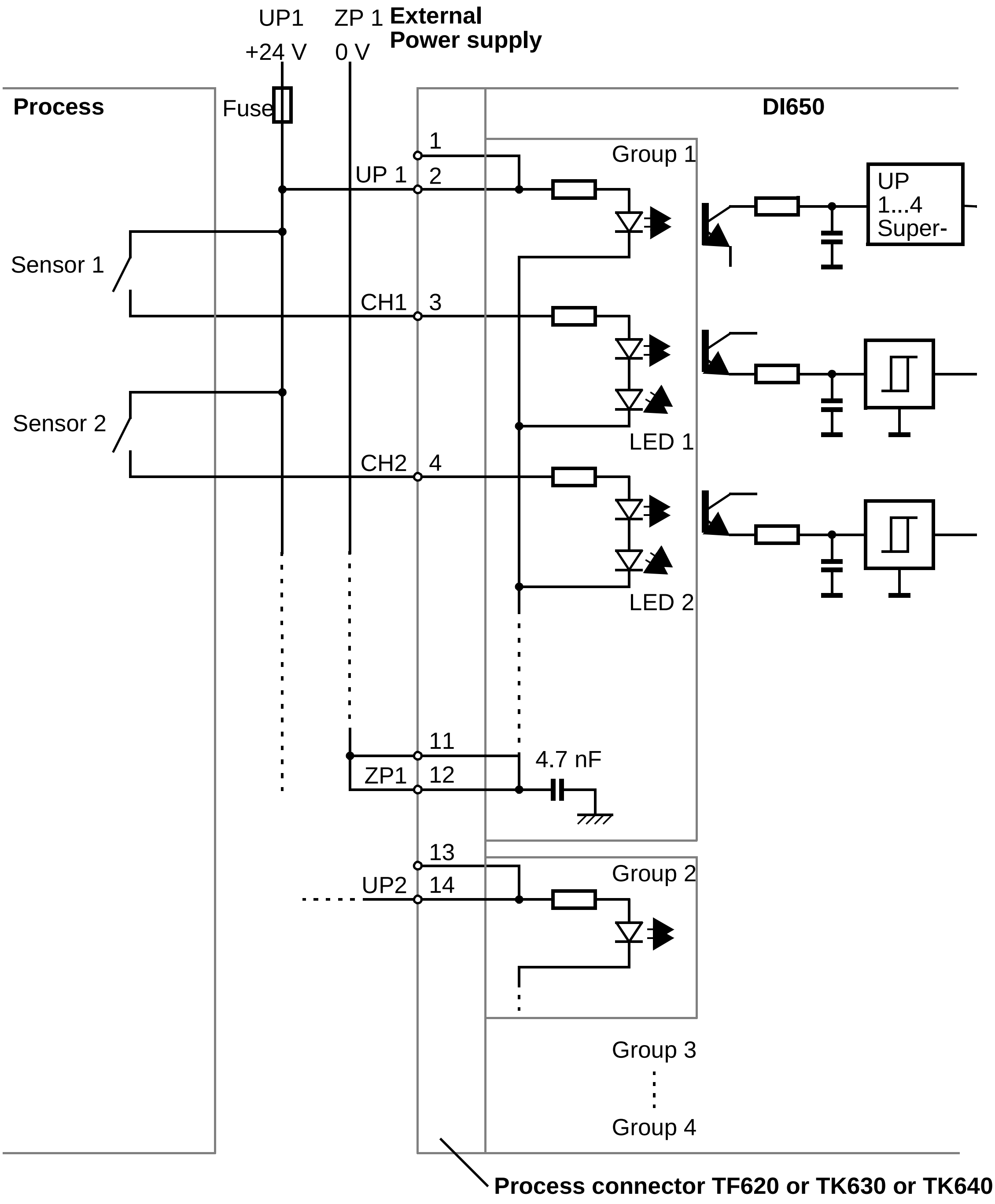


Figure 3-75. DI650, example of process connections

Functional description

The digital input module DI650 has 32 input channels for 24 V DC, isolated in 4 groups per 8 signals by opto-couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter. The filter time is adjustable per DI650 module.

DI650 can be used in three different modes.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

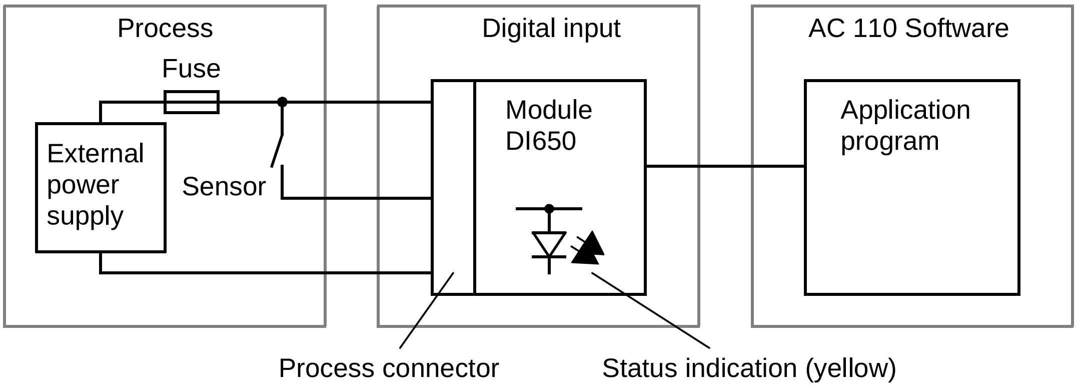


Figure 3-76. DI650 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI650 are designed for 24 V input signals. The typical input current of each channel is 8.3 mA. The input circuits must be supplied by an external 24 V DC process voltage. The process voltage and electronic power supply are not isolated, i.e., the two grounds are galvanically connected.

The input module DI650 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals of the input module DI650 can be filtered to suppress any electrical interference or contact bounce. The filter times is selectable from 0 to 256 ms in powers of two.

Modes

The channels of DI650 can be used for pulse catching, for event recording or simply as digital inputs.

- Pulse catching

Pulse catching means selectable filtering as well as prolongation of positive input pulses. Pulse prolongation is possible from the chosen bounce filter time up to 4000 milliseconds. Pulse prolongation parameter = 0 switches pulse prolongation off.

- Event recording

If DI650 is not used for pulse prolongation, it can be used for event recording (SOE), i.e., changing signals at digital input channels can be announced together with a time stamp indicating when it occurred. The time stamp has a resolution of 1 millisecond.

The module has intermediate storage for 64 events.

Those events are not visible for users of the AC 110, but via an Advant Fieldbus 100 or RCOM link, they can be transferred to an Advant Controller series 400 (AC 4xx) and displayed on an Advant Station Series 500 (Operator Station) which is connected to the AC 4xx. In the AC 110 system software, “Event option” (OPT3) and possibly “RCOM option” (OPT2) are necessary to use SOE announcement. See the manuals *AMPL Configuration - Advant Controller 100 Series Reference Manual* and *RCOM - Advant Controller 110 User’s Guide*. SOE capability can be enabled per input channel, with a module used for event (SOE), this SOE - capability can be enabled or disabled per input channel.

For all channels with enabled SOE capability, a shutter filter is implemented that prevents intermediate storage for events from overflow. The shutter filter is closed as soon as the number of events generated within the shutter period exceeds the shutter trigger number (0 - 256 seconds). The shutter filter remains closed as long as the recovery time (0 - 65000 seconds) has not expired.

With enabled SOE capability, only bounce filter times from 0 to 32 milliseconds are selectable.

- Simple digital input

If neither the pulse catching nor the event recording capabilities are used, DI650 acts like DI620 but with selectable filter times.

3.21 DI651

Summary

The digital input module DI651 converts the binary signals from the sensors to the internal signal levels required by the internal controller. It has 32 channels for 48 V DC, isolated by opto couplers. It can be used in three different modes:

- digital input
- digital input with pulse catching
- digital input with event recording.

Associated data base elements

Associated data base elements are DI651 for the module and DIS651 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-28. DI651 Technical data

Digital Input	DI651
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 48 V DC -60 to +10 V DC +30 to +60 V DC
Input current typ.	5 mA
Time delay typ.(1)	selectable 0 to 256 ms
Operating modes	event-recording pulse-catching digital input
Pulse prolongation	bounce filter time ...4000 ms or off
Shutter filter in event-recording mode: recovery time shutter-triggering shutter-period	 0 to 65000 s 0 to 256 changes 0 to 256 s
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 500 V rms
Monitoring inputs for UP	4
Current consumption - typ.(2) - max.(3)	 63 mA 84 mA
Power dissipation - typ.(4) - max.(5)	 9.2 W 14 W
Weight	1.1 kg

(1) For event-recording mode, 0-32 ms. If bounce filter is turned off, use screened cable.

(2) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(3) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(4) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(5) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

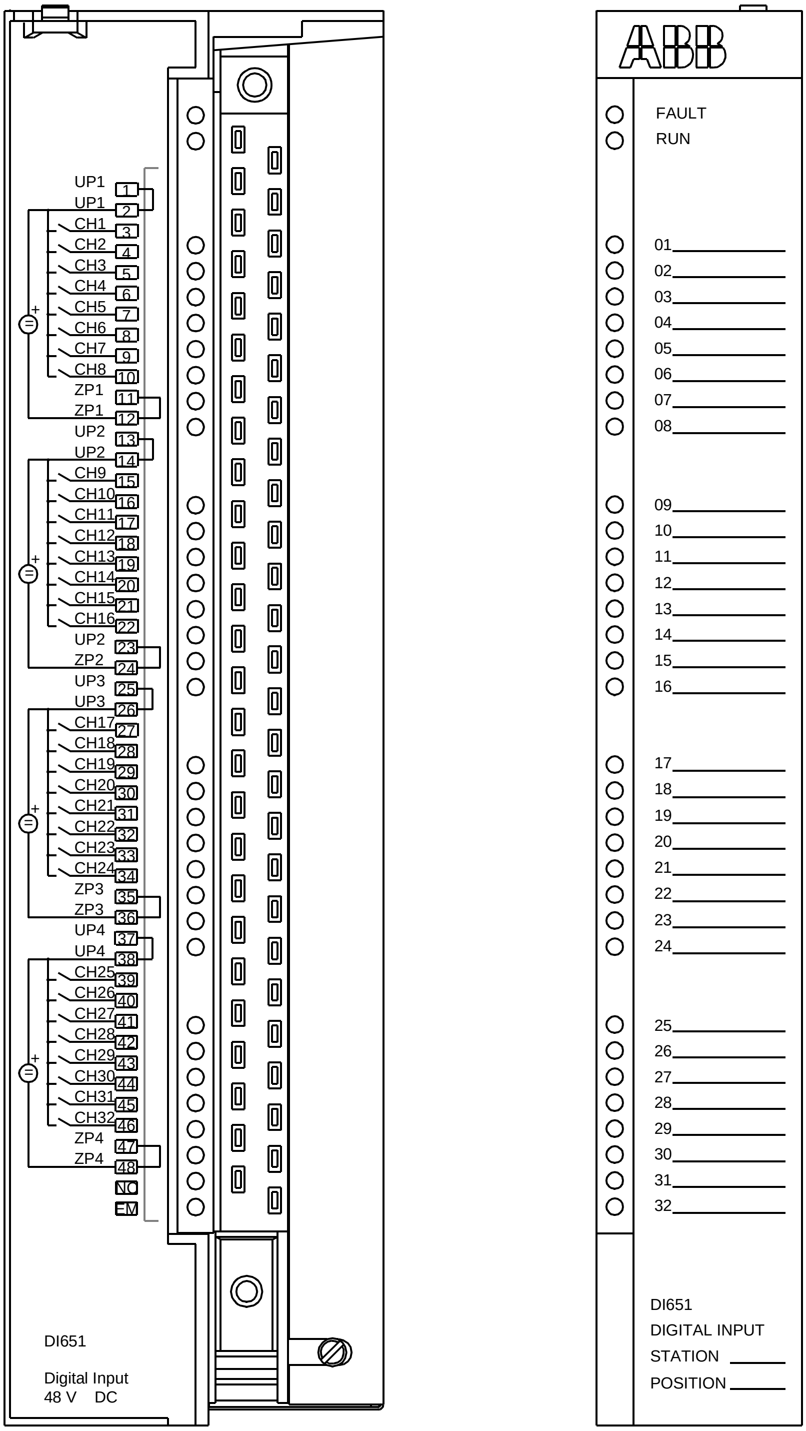


Figure 3-77. DI651 Front view

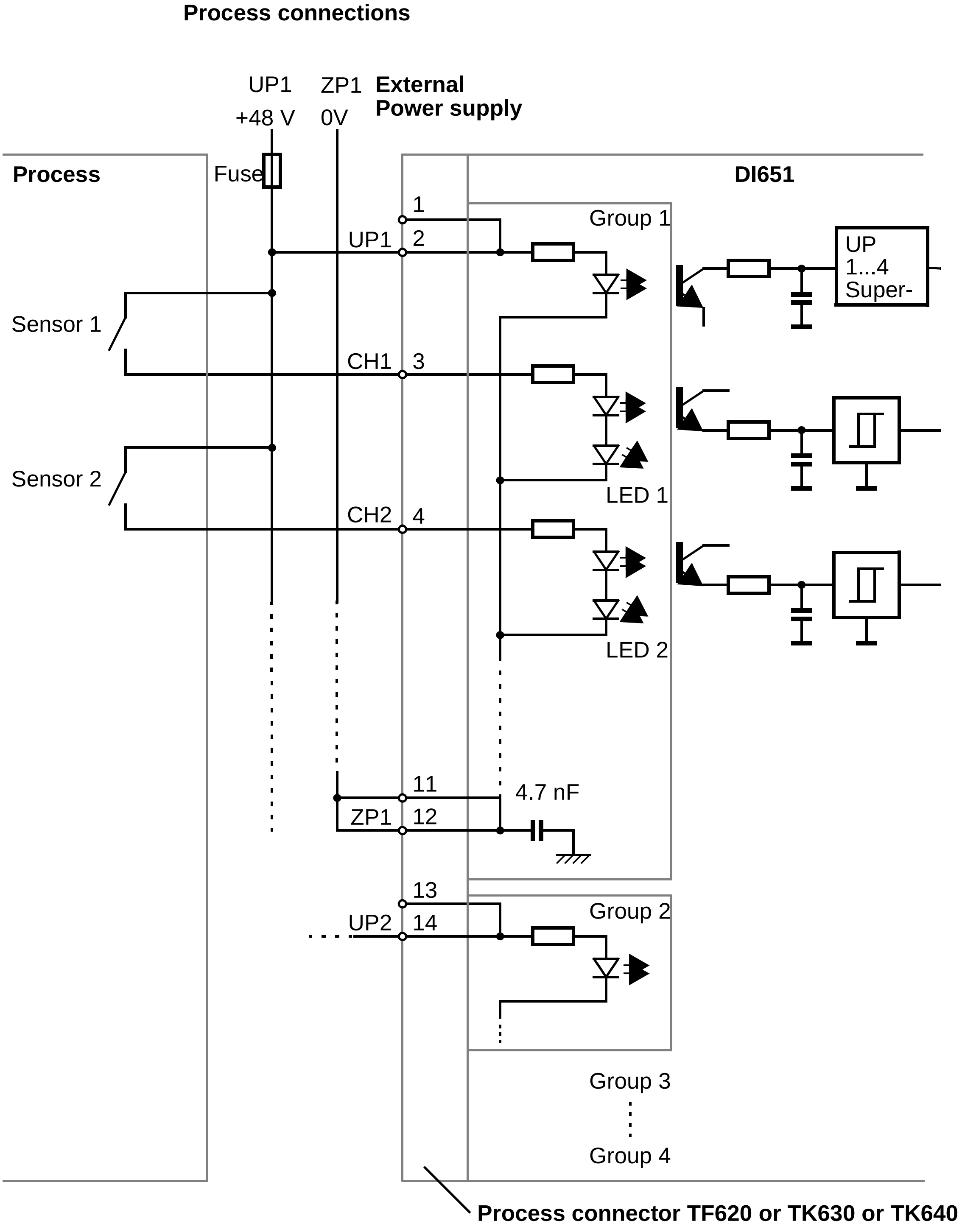


Figure 3-78. DI651, example of process connections

Functional description

The digital input module DI651 has 32 input channels for 48 V DC, isolated in 4 groups per 8 signals by opto-couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter. The filter time is adjustable per DI651 module.

DI651 can be used in three different modes.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

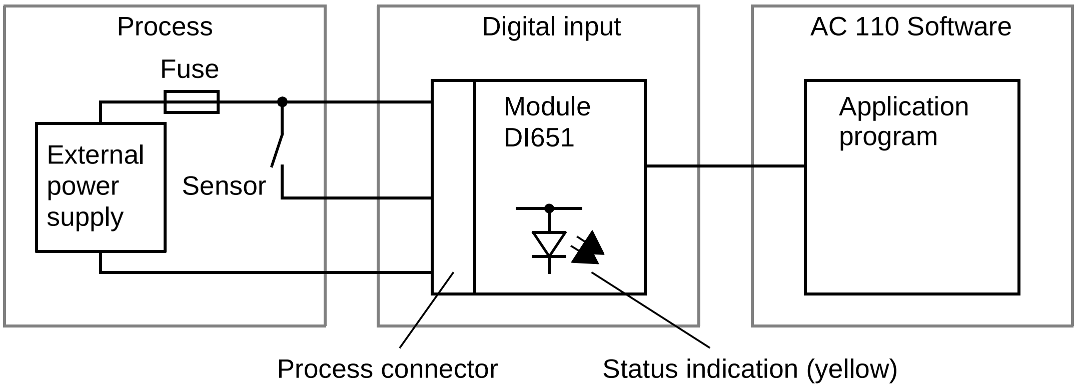


Figure 3-79. DI651 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI651 are designed for 48 V input signals. The typical input current of each channel is 5 mA. The input circuits must be supplied by an external 48 V DC process voltage. The process voltage and electronic power supply are not isolated, i.e., the two grounds are galvanically connected.

The input module DI651 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals of the input module DI651 can be filtered to suppress any electrical interference or contact bounce. The filter times is selectable from 0 to 256 ms in powers of two.

Modes

The channels of DI651 can be used for pulse catching, for event recording or simply as digital inputs.

- Pulse catching

Pulse catching means selectable filtering as well as prolongation of positive input pulses. Pulse prolongation is possible from the chosen bounce filter time up to 4000 milliseconds. Pulse prolongation parameter = 0 switches pulse prolongation off.

- Event recording

If DI651 is not used for pulse prolongation, it can be used for event recording (SOE), i.e., changing signals at digital input channels can be announced together with a time stamp indicating when it occurred. The time stamp has a resolution of 1 millisecond.

The module has intermediate storage for 64 events.

Those events are not visible for users of the AC 110, but via an Advant Fieldbus 100 or RCOM link, they can be transferred to an Advant Controller series 400 (AC 4xx) and displayed on an Advant Station Series 500 (Operator Station) which is connected to the AC 4xx. In the AC 110 system software, “Event option” (OPT3) and possibly “RCOM option” (OPT2) are necessary to use SOE announcement. See the manuals *AMPL Configuration - Advant Controller 100 Series Reference Manual* and *RCOM - Advant Controller 110 User’s Guide*. SOE capability can be enabled per input channel, with a module used for event (SOE), this SOE - capability can be enabled or disabled per input channel.

For all channels with enabled SOE capability, a shutter filter is implemented that prevents intermediate storage for events from overflow. The shutter filter is closed as soon as the number of events generated within the shutter period exceeds the shutter trigger number (0 - 256 seconds). The shutter filter remains closed as long as the recovery time (0 - 65000 seconds) has not expired.

With enabled SOE capability, only bounce filter times from 0 to 32 milliseconds are selectable.

- Simple digital input

If neither the pulse catching nor the event recording capabilities are used, DI651 acts like DI621 but with selectable filter times.

3.22 DI652

Summary

The digital input module DI652 converts the binary signals from the sensors to the internal signal levels required by the internal controller. It has 32 channels for 60 V DC, isolated by opto couplers. It can be used in three different modes:

- digital input
- digital input with pulse catching
- digital input with event recording.

Associated data base elements

Associated data base elements are DI652 for the module and DIS652 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-29. DI652 Technical data

Digital Input	DI652
No. of inputs	32
Input voltage - Rated voltage UP - Input voltage range „0“ - Input voltage range „1“	 60 V DC -75 to +13 V DC +37 to +75 V DC
Input current typ.	4 mA
Time delay typ.(1)	selectable 0 to 256 ms
Operating modes	event-recording pulse-catching digital input
Pulse prolongation	bounce filter time ...4000 ms or off
Shutter filter in event-recording mode: recovery time shutter-triggering shutter-period	 0 to 65000 s 0 to 256 changes 0 to 256 s
Cable length, max.	1000 m
Isolation - in groups per - test voltage	yes, opto 8 1800 V rms
Monitoring inputs for UP	4
Current consumption - typ.(2) - max.(3)	 63 mA 84 mA
Power dissipation - typ.(4) - max.(5)	 10.2 W 16.5 W
Weight	1.1 kg

(1) For event-recording mode, 0-32 ms. If bounce filter is turned off, use screened cable.

(2) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated.

(3) Maximum consumption from electronic power supply USA/USB at maximum supply voltage and all inputs activated.

(4) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated.

(5) Total power dissipation at maximum supply voltage and all inputs activated.

Front view

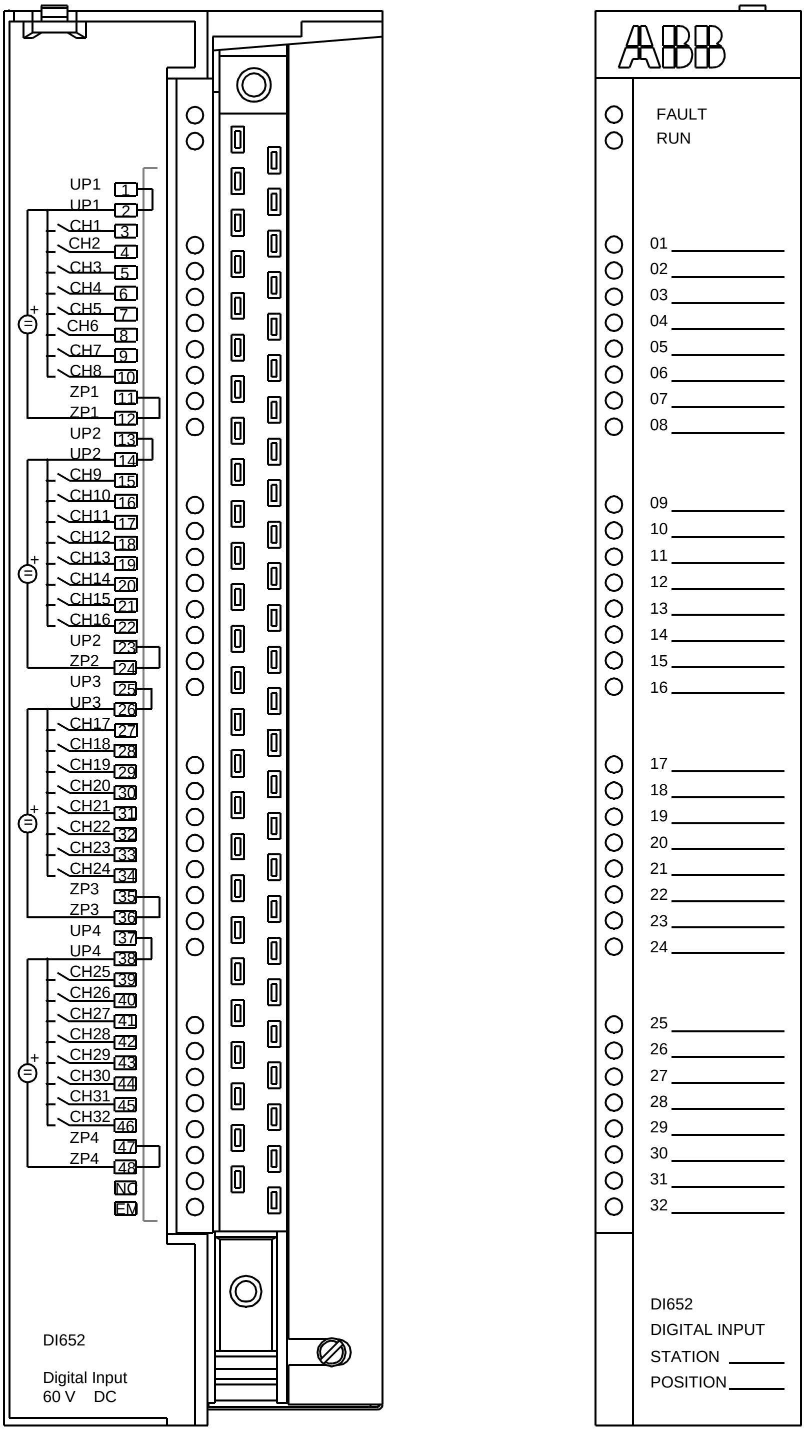


Figure 3-80. DI652 Front view

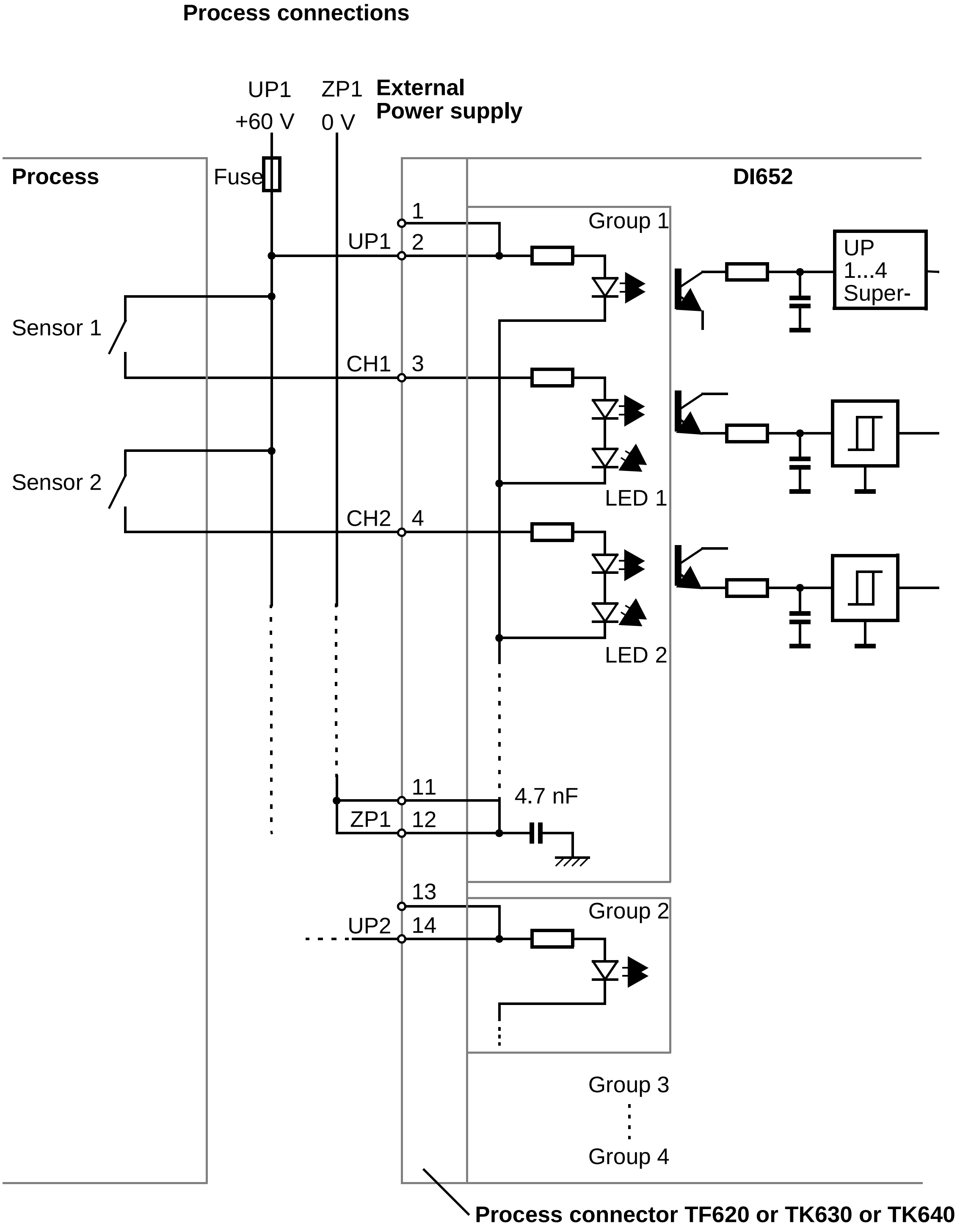


Figure 3-81. DI652, example of process connections

Functional description

The digital input module DI652 has 32 input channels for 60 V DC, isolated in 4 groups per 8 signals by opto-couplers. It converts the binary signals from the sensors to the internal signal levels required by the programmable controller.

Each input has a contact bounce filter. The filter time is adjustable per DI652 module.

DI652 can be used in three different modes.

There are thirty-four LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual input is indicated by one of the remaining thirty-two yellow LEDs.

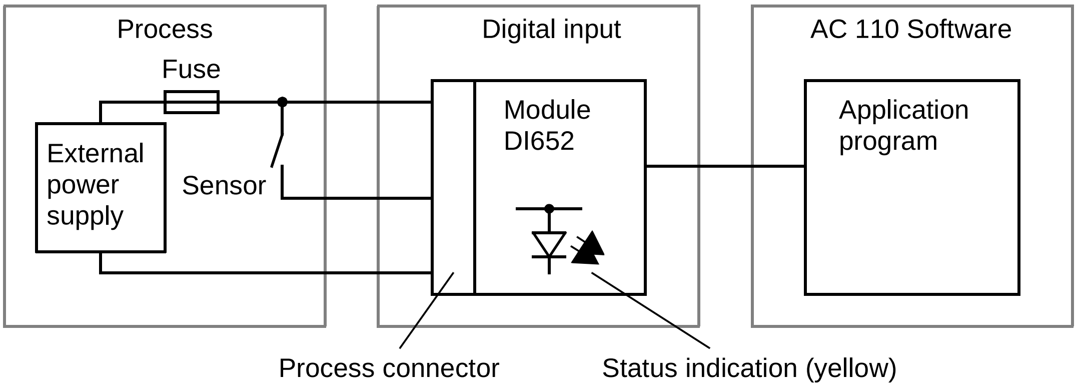


Figure 3-82. DI652 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights.

A monitoring circuit in the digital input modules monitors the external process voltages UPx. The UP supervision responds if at least one of the process voltages is too low, which is indicated by the data base element.

Characteristics of input channels

The input channels of DI652 are designed for 60 V input signals. The typical input current of each channel is 4 mA. The input circuits must be supplied by an external 60 V DC process voltage. The process voltage and electronic power supply are not isolated, i.e., the two grounds are galvanically connected.

The input module DI652 has 32 isolated inputs arranged in four groups of eight inputs with a common return (ZP).

All four groups are isolated from one another and from the electronic power supply of the backplane.

Filtering

The input signals of the input module DI652 can be filtered to suppress any electrical interference or contact bounce. The filter times is selectable from 0 to 256 ms in powers of two.

Modes

The channels of DI652 can be used for pulse catching, for event recording or simply as digital inputs.

- Pulse catching

Pulse catching means selectable filtering as well as prolongation of positive input pulses. Pulse prolongation is possible from the chosen bounce filter time up to 4000 milliseconds. Pulse prolongation parameter = 0 switches pulse prolongation off.

- Event recording

If DI652 is not used for pulse prolongation, it can be used for event recording (SOE), i.e., changing signals at digital input channels can be announced together with a time stamp indicating when it occurred. The time stamp has a resolution of 1 millisecond.

The module has intermediate storage for 64 events.

Those events are not visible for users of the AC 110, but via an Advant Fieldbus 100 or RCOM link, they can be transferred to an Advant Controller series 400 (AC 4xx) and displayed on an Advant Station Series 500 (Operator Station) which is connected to the AC 4xx. In the AC 110 system software, “Event option” (OPT3) and possibly “RCOM option” (OPT2) are necessary to use SOE announcement. See the manuals *AMPL Configuration - Advant Controller 100 Series Reference Manual* and *RCOM - Advant Controller 110 User’s Guide*. SOE capability can be enabled per input channel, with a module used for event (SOE), this SOE - capability can be enabled or disabled per input channel.

For all channels with enabled SOE capability, a shutter filter is implemented that prevents intermediate storage for events from overflow. The shutter filter is closed as soon as the number of events generated within the shutter period exceeds the shutter trigger number (0 - 256 seconds). The shutter filter remains closed as long as the recovery time (0 - 65000 seconds) has not expired.

With enabled SOE capability, only bounce filter times from 0 to 32 milliseconds are selectable.

- Simple digital input

If neither the pulse catching nor the event recording capabilities are used, DI652 acts like DI620 but with selectable filter times.

3.23 DO610

Summary

The digital ouput module DO610 converts the internal binary signals of the programmable controller into the binary signal levels required to control the process. It has 32 channels for 24 V DC. The outputs are not isolated.

Associated data base elements

Associated data base elements are DO610 for the module and DOS610 for its output channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-30. DO610 Technical data

Digital Output	DO610
No. of outputs	32
Output voltage - Rated voltage UP - Load supply, min. - Load supply, max. Voltage drop, max.	 24 V DC 18 V DC 30 V DC 0.5 V
Output current, rated Output current, max. Output current, min. Leakage current, max. DC output load, max. Lamp load, max. Inductive load	200 mA 240 mA - 1 mA - 2 W -
Max Total load Current	$(I_{load})_{TOT}$ = 4.5 A
Type of output	Transistor source
Life expectancy of the relays - mechanical - electrical	 - -
Short-circuit protection	yes, electronic
Isolation - in groups per - test voltage	no - -
Monitoring for UP	yes
Cable length, max.	1000 m
Current consumption - typ.(1) - max.(2)	 25 mA 30 mA
Power dissipation - typ.(3) - max.(4)	 5.7 W 12 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated and loaded at 50 percent of the rated load.

(2) Maximum consumption from power supply USA/USB at maximum supply voltage and all outputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated and loaded at 50 percent of the rated current.

(4) Total power dissipation at maximum supply voltage and maximum output current.

Front view

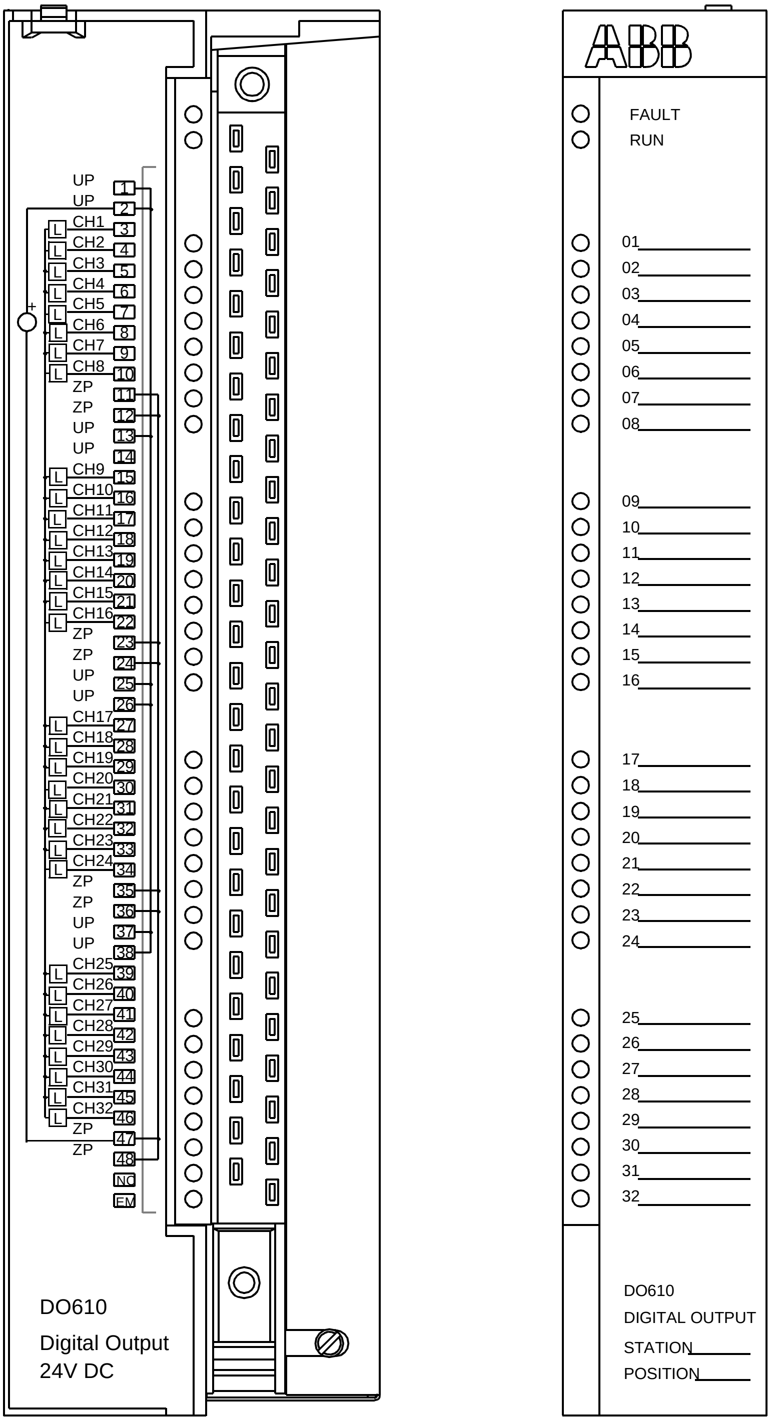


Figure 3-83. DO610 Front view

Process connections

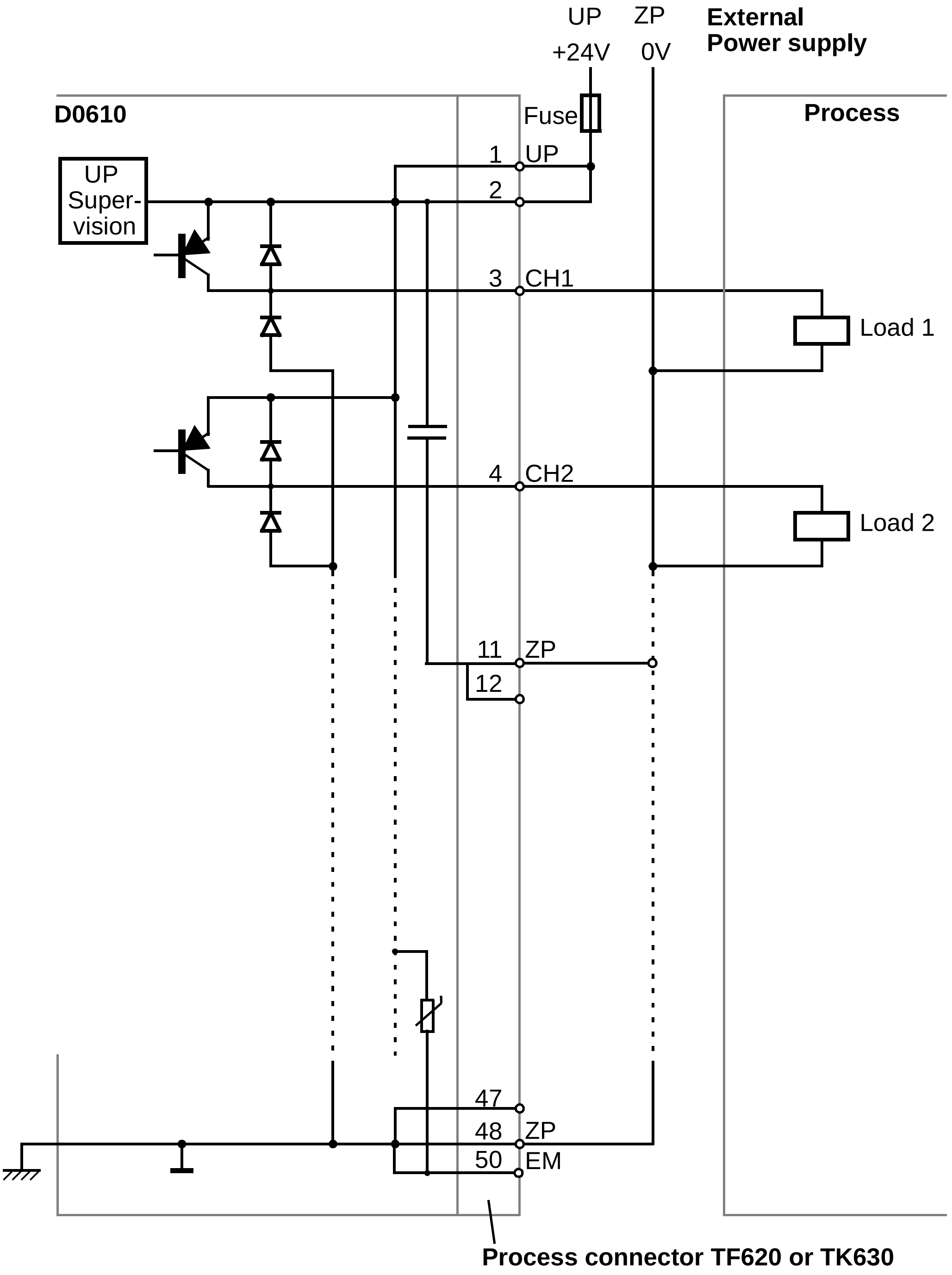


Figure 3-84. DO610, example of process connections

Functional description

The digital output module DO610 has 32 output channels for 24 V DC. The outputs are not isolated. They are of transistor type and short circuit protected.

There are thirtyfour LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual output is indicated by one of the remaining thirty-two yellow LEDs.

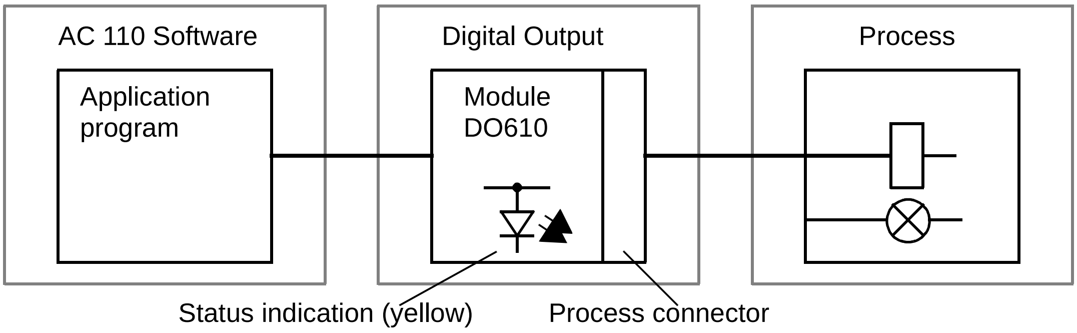


Figure 3-85. DO610 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights and the outputs are set to „0“.

The output circuits of the modules consist of a number of outputs with register of output data. Logical „1“ corresponds to an active output.

After powering up, all outputs are switched off (logical „0“) and remain so until the Advant Controller 110 programmable controller sets the module to the operating mode.

Output characteristics

The output module DO610 is equipped with thirtytwo 24 V/0.2 A DC transistor outputs.

The process voltage and the power supply of the electronic system components are not isolated, i.e., the ground terminal ZP is connected to the ground ZD of the backplane.

A monitoring circuit in the digital output module DO610 monitors the process voltage UP. The UP supervision responds if the process voltage is too low, indicating this by the corresponding data base element.

3.24 DO620

Summary

The digital ouput module DO620 converts the internal binary signals of the programmable controller into the binary signal levels required to control the process. It has 32 channels for 48 V DC. The outputs are isolated in groups per 8.

Associated data base elements

Associated data base elements are DO620 for the module and DOS620 for its output channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-31. DO620 Technical data

Digital Output	DO620
No. of outputs	32
Output voltage - Rated voltage UP - Load supply, min. - Load supply, max. Voltage drop, max.	 48 V DC 18 V DC 60 V DC 0.4 V
Output current, rated Output current, max. Output current, min. Leakage current, max. DC output load, max. Lamp load, max. Inductive load	500 mA 600 mA - 0.5 mA - 5W -
Max Total load Current	$(I_{load})_{TOT}$ = 16 A
Type of output	Transistor source
Life expectancy of the relays - mechanical - electrical	 - -
Short-circuit protection	yes, electronic
Isolation - in groups per - test voltage	yes, opto 8 500 V rms
Monitoring for UP	no
Cable length, max.	1000 m
Current consumption - typ.(1) - max.(2)	 161 mA 290 mA
Power dissipation - typ.(3) - max.(4)	 5 W 13.5 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated and loaded at 50 percent of the rated load.

(2) Maximum consumption from power supply USA/USB at maximum supply voltage and all outputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated and loaded at 50 percent of the rated current.

(4) Total power dissipation at maximum supply voltage and maximum output current.

Front view

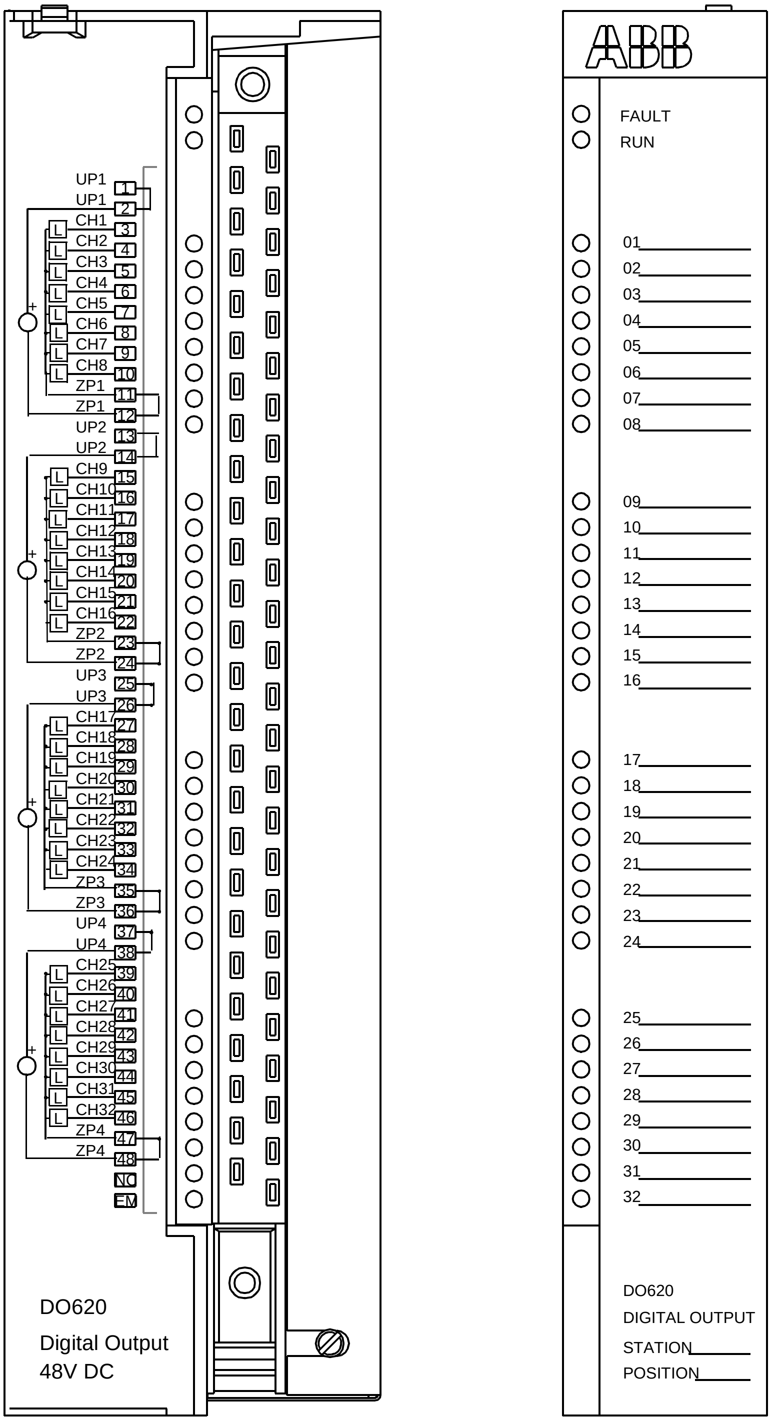


Figure 3-86. DO620 Front view

Process connections

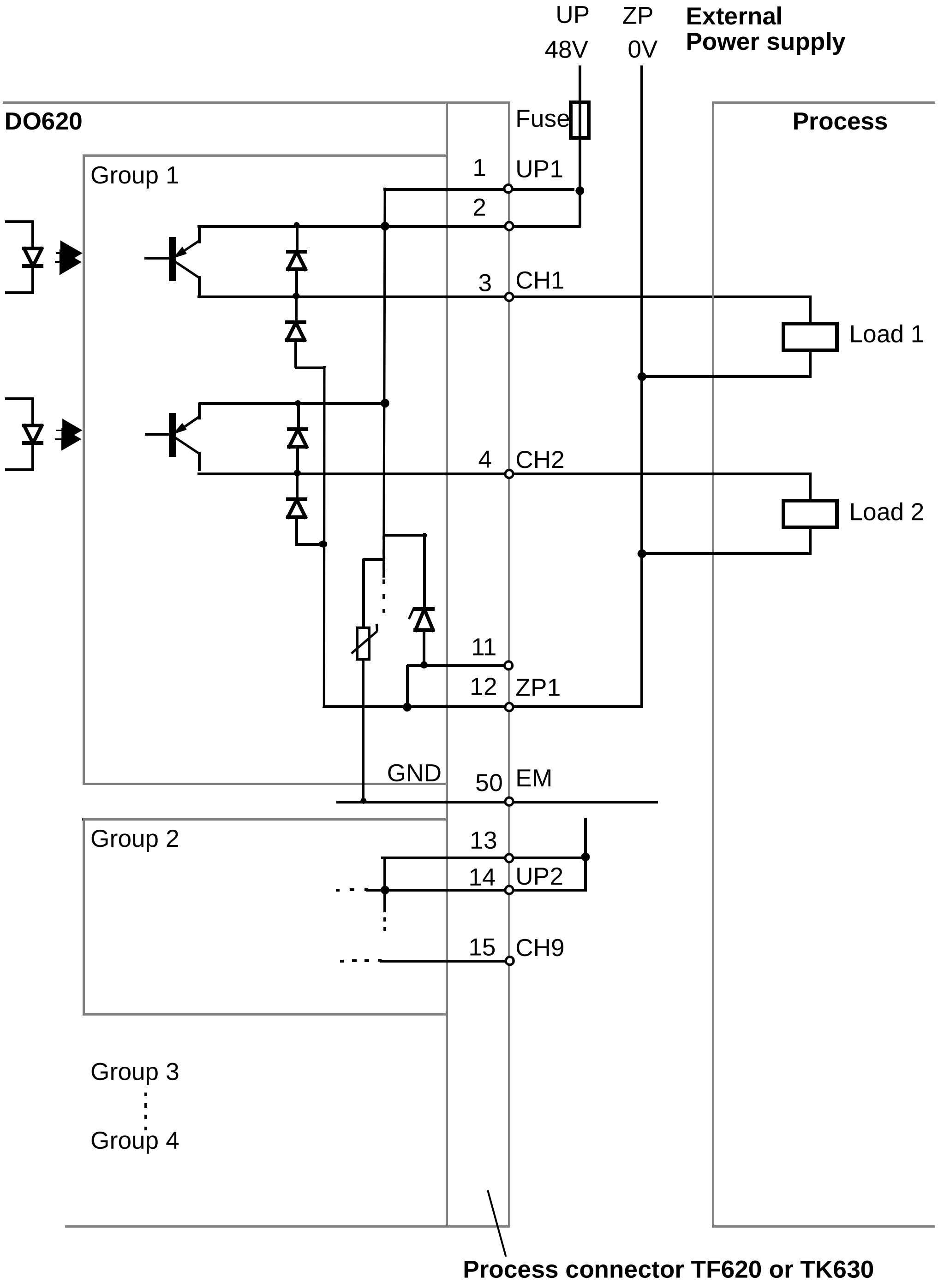


Figure 3-87. DO620, example of process connections

Functional description

The digital output module DO620 has 32 output channels for 48 V DC. The outputs are isolated in 4 groups per 8 outputs. They are of Transistor type and short circuit protected.

There are thirtyfour LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual output is indicated by one of the remaining thirty-two yellow LEDs.

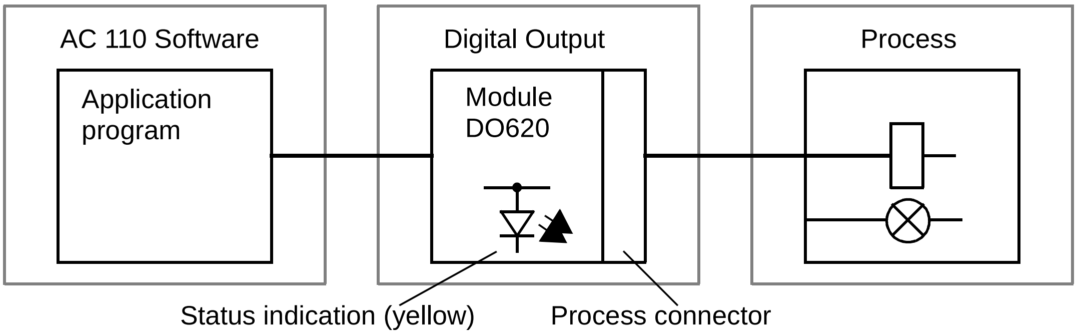


Figure 3-88. DO620 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights and the outputs are set to „0“.

The output circuits of the modules consist of a number of outputs with register of output data. Logical „1“ corresponds to an active output.

After powering up, all outputs are switched off (logical „0“) and remain so until the Advant Controller 110 programmable controller sets the module to the operating mode.

Output characteristics

The output module DO620 is equipped with thirtytwo 48 V/0.5 A DC transistor outputs.

The process voltage and the power supply of the electronic system components are isolated, via opto couplers in groups per 8 outputs. The process voltage UP is not monitored.

3.25 DO625

Summary

The digital ouput module DO625 converts the internal binary signals of the programmable controller into the binary signal levels required to control the process. It has 16 channels for 24 V DC. The outputs are isolated in groups per 2.

Associated data base elements

Associated data base elements are DO625 for the module and DOS625 for its output channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-32. DO625 Technical data

Digital Output	DO625
No. of outputs	16
Output voltage - Rated voltage UP - Load supply, min. - Load supply, max. Voltage drop, max.	 24 V DC 18 V DC 30 V DC 0.6 V
Output current, rated Output current, max. Output current, min. Leakage current, max. DC output load, max. Lamp load, max. Inductive load	2 A 2.4 A - 1 mA - 25W -
Max Total load Current	$(I_{load})_{TOT}$ = 16 A
Type of output	Solid-state switches (MOSFET)
Life expectancy of the relays - mechanical - electrical	 - -
Short-circuit protection	yes, electronic
Isolation - in groups per - test voltage	yes, 2 500 V rms
Monitoring for UP	no
Cable length, max.	1000 m
Current consumption - typ.(1) - max.(2)	 50 mA 80 mA
Power dissipation - typ.(3) - max.(4)	 5 W 13.1 W
Weight	1.1 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated and loaded at 50 percent of the rated load.

(2) Maximum consumption from power supply USA/USB at maximum supply voltage and all outputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated and loaded at 50 percent of the rated current.

(4) Total power dissipation at maximum supply voltage and maximum output current.

Front view

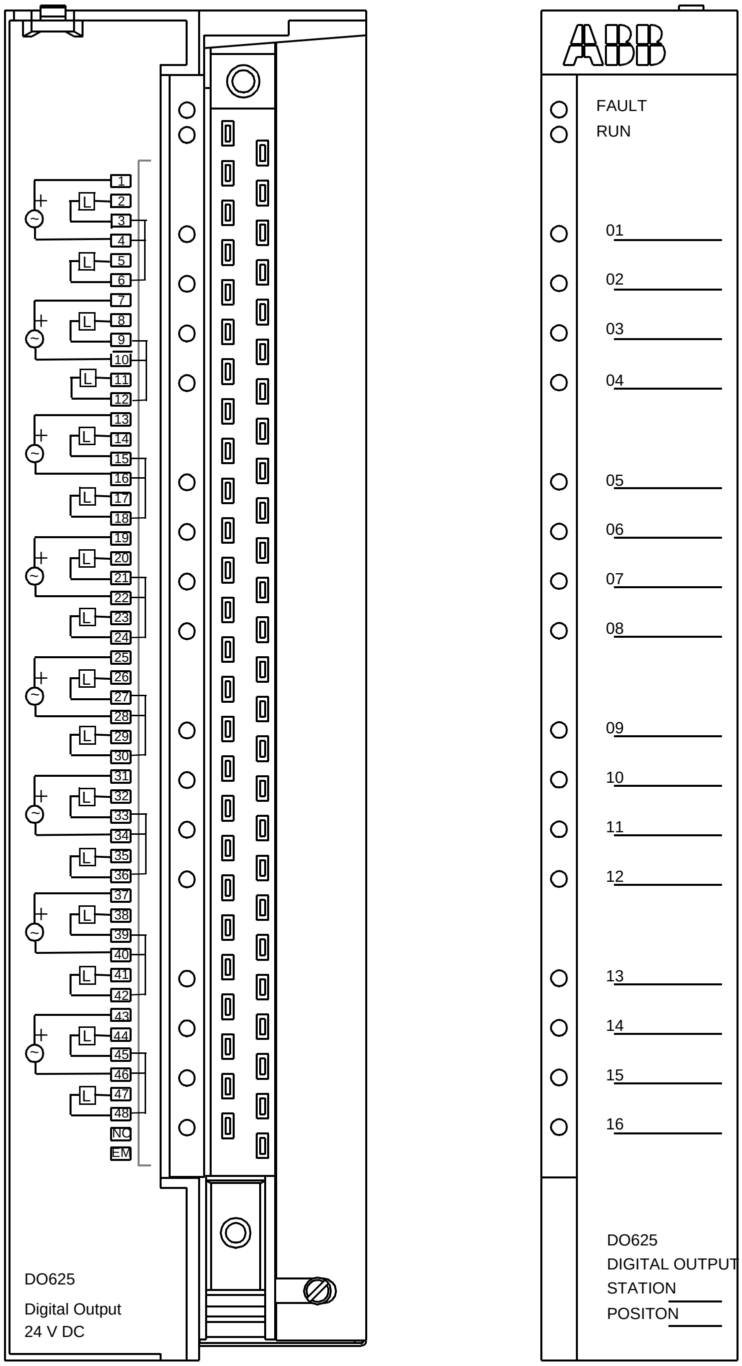


Figure 3-89. DO625 Front view

Process connections

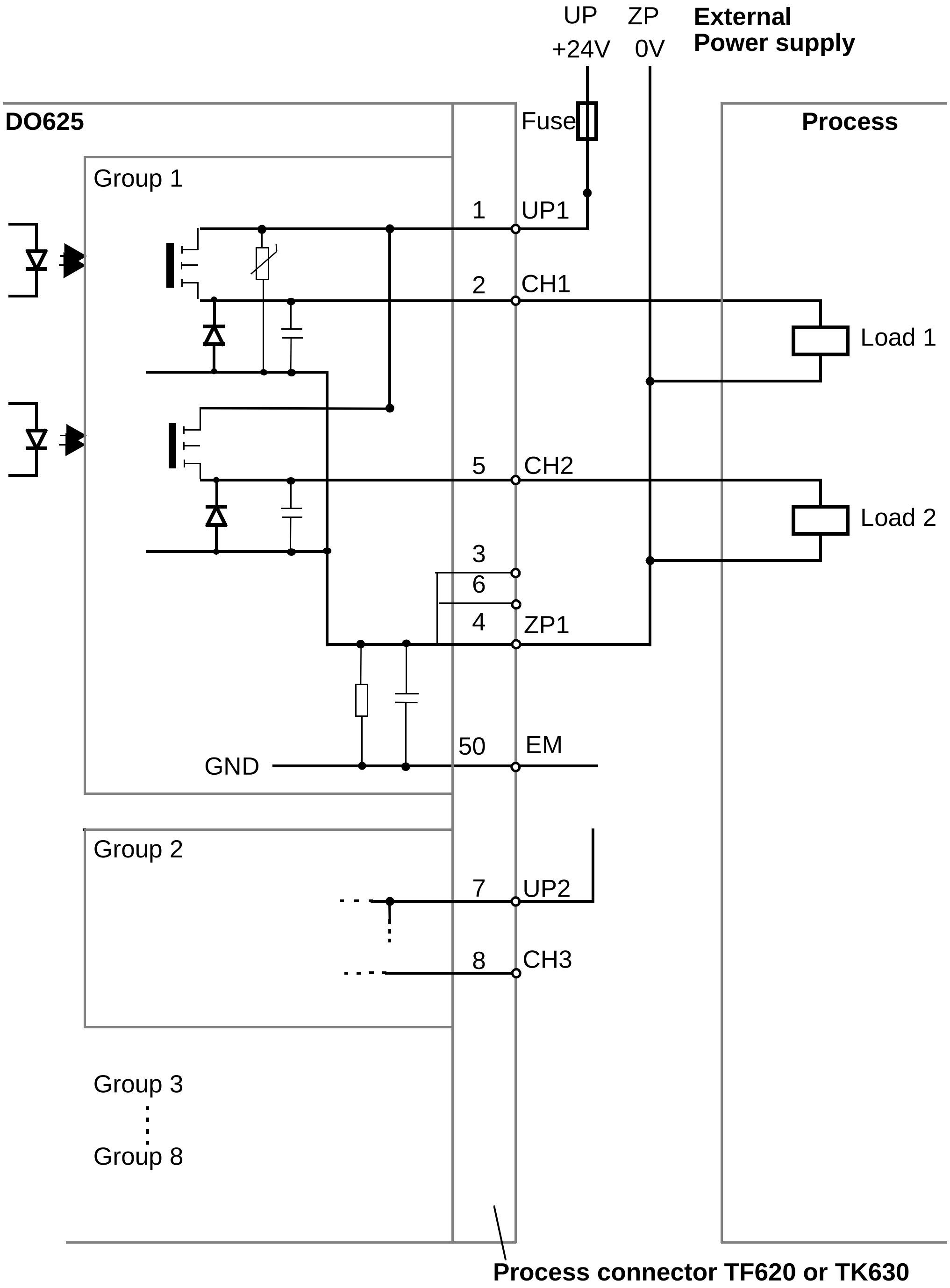


Figure 3-90. DO625, example of process connections

Functional description

The digital output module DO625 has 16 output channels for 24 V DC. The outputs are isolated in eight groups with two outputs. They are each of MOSFET type and short circuit protected.

There are eighteen LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual output is indicated by one of the remaining 16 yellow LEDs.

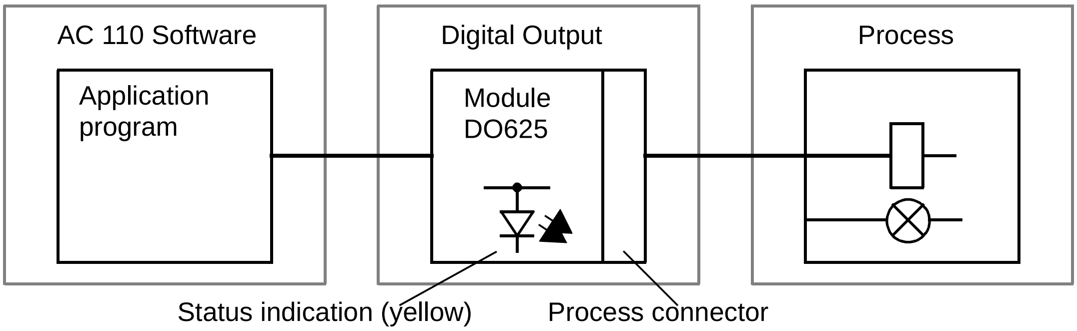


Figure 3-91. DO625 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights and the outputs are set to „0“.

The output circuits of the modules consist of a number of outputs with register of output data. Logical „1“ corresponds to an active output.

After powering up, all outputs are switched off (logical „0“) and remain so until the Advant Controller 110 programmable controller sets the module to the operating mode.

Output characteristics

The output module DO625 is equipped with sixteen 24 V/2 A DC MOSFET outputs.

The process voltage and the power supply of the electronic system components are isolated, in groups per 2 outputs. The process voltage UP is not monitored.

3.26 DO630

Summary

The digital ouput module DO630 converts the internal binary signals of the programmable controller into the binary signal levels required to control the process. It has 16 channels with relay outputs (230 V DC/AC). The outputs are individually isolated.

Associated data base elements

Associated data base elements are DO630 for the module and DOS630 for its output channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-33. DO630 Technical data

Digital Output	DO630
No. of outputs	16
Output voltage - Rated voltage UP - Load supply, min. - Load supply, max. Voltage drop, max.	 230 V DC/AC 12 V DC/AC 250 V DC/AC -
Output current, rated Output current, max. Output current, min. Leakage current, max. DC output load, max. Lamp load, max. Inductive load	2 A 2.4 A 20 mA - 40 W 40 W L/R<8 ms
Max Total load Current	16 * Channel data
Type of output	Relay contacts
Life expectancy of the relays - mechanical - electrical	 20 x 10^6 operations 1 x 10^6 operations
Short-circuit protection	no
Isolation - in groups per - test voltage	yes, Relais 1 (individual) 2200 V rms
Monitoring for UP	no
Cable length, max.	1000 m
Current consumption - typ.(1) - max.(2)	 148 mA 265 mA
Power dissipation - typ.(3) - max.(4)	 3.6 W 5.8 W
Weight	1.2 kg

(1) Typical consumption from electronic power supply USA/USB with 70 percent of the channels activated and loaded at 50 percent of the rated load.

(2) Maximum consumption from power supply USA/USB at maximum supply voltage and all outputs activated.

(3) Total power dissipation at rated supply voltage, with 70 percent ot the channels activated and loaded at 50 percent of the rated current.

(4) Total power dissipation at maximum supply voltage and maximum output current.

Front view

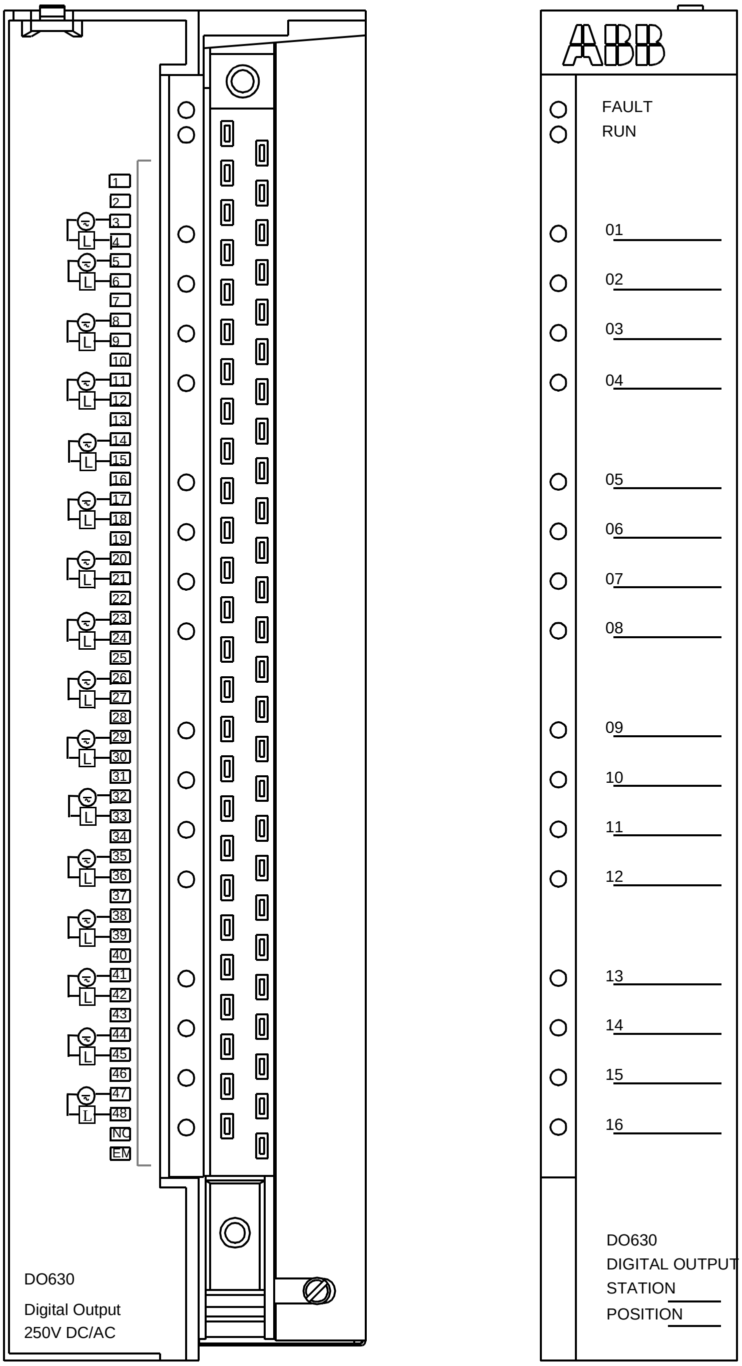


Figure 3-92. DO630 Front view

Process connections

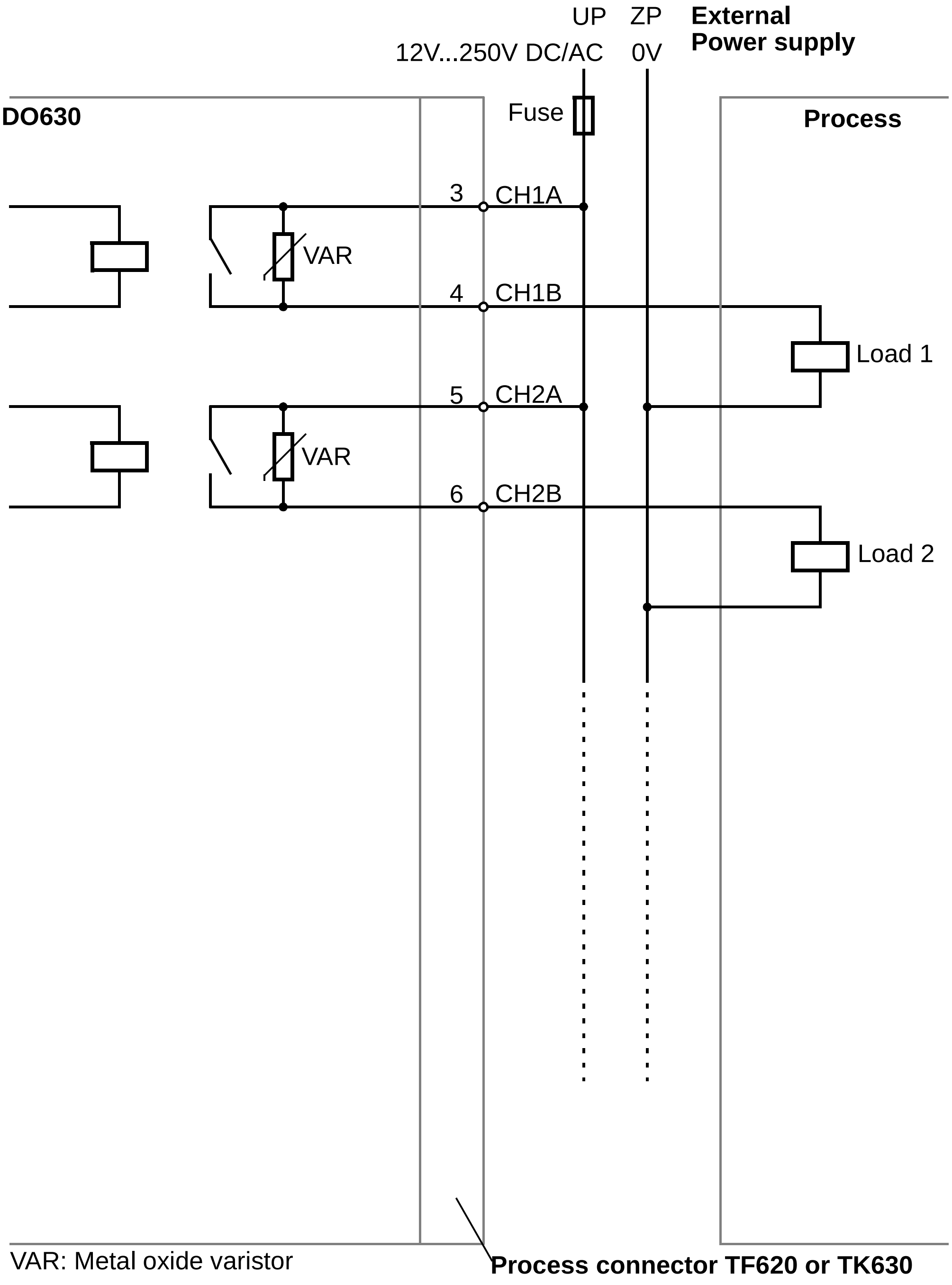


Figure 3-93. DO630, example of process connections

Functional description

The digital output module DO630 has 16 output channels. The outputs are individually isolated. They are of relay type and not short circuit protected.

There are eighteen LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally. A red LED (FAULT) signals a severe fault. The status of each individual output is indicated by one of the remaining 16 yellow LEDs.

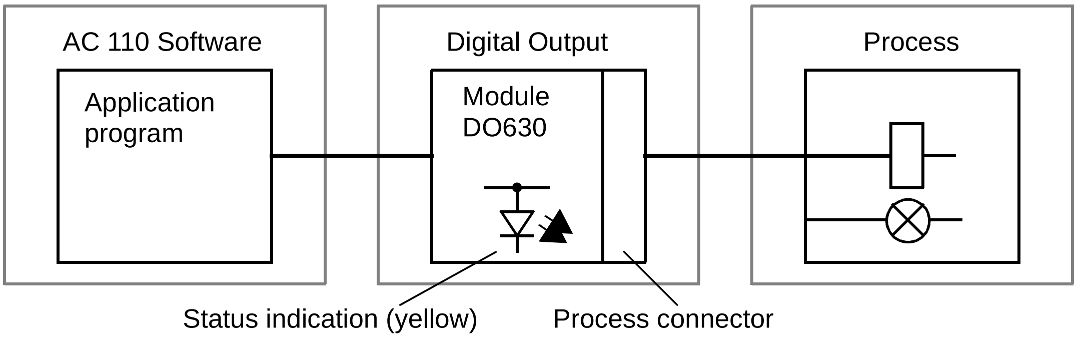


Figure 3-94. DO630 Block diagram

If a severe fault is detected, the LED (FAULT) on the front of the module lights and the outputs are set to „0“.

The output circuits of the modules consist of a number of outputs with register of output data. Logical „1“ corresponds to an active output.

After powering up, all outputs are switched off (logical „0“) and remain so until the Advant Controller 110 programmable controller sets the module to the operating mode.

Output characteristics

The output module DO630 is equipped with sixteen 12...230 V DC/AC relay outputs.

The process voltage and the power supply of the electronic system components are isolated. The process voltage UP is not monitored.

3.27 DP620

Summary

The pulse counter module DP620 registers and processes fast pulse signals at repetition rates up to 100 kHz. Six different operating modes are provided.

The module has five reversible 32-bit counters. Each counter has four process inputs. Via the DB element, the operating mode and the interaction between the inputs and the counters can be selected individually.

All inputs are electrically isolated from each other and from the backplane supply by opto-couplers.

Associated data base elements

Associated data base elements are DP620 for the module and DPS620 for its input channels.

Module replacement

On-line replacement is possible. No jumpering and no adjustments are required.

Technical data

Table 3-34. DP620 Technical data

Pulse counter module	DP620
Number of channels	5
Operating modes:	Up-counting Up-/down-counting Frequency measurement Difference measurement Position measurement Rotation-speed measurement
Connector type on module	15-pin Sub-D, female (per channel), shield connected to module chassis
Inputs per channel	A B Strobe Set
Type of input signals - A, B and Strobe inputs - Set input	 LD, 24 V, TTL 24 V

Table 3-34. DP620 Technical data (Continued)

Pulse counter module	DP620
Input signals for A, B and Strobe - 5 V Line driver or ± 13 mA current loop (LD)	-5 V < UL < 0.5 V 2.3 V < UH < 3.6 V -20 mA < IL < 2.3 mA 10 mA < IH < 16 mA Ri = 220 Ohms typ
- 24 V DC / 8.3 mA (24 V) - 5 V DC TTL (TTL)	-30 V < UL < 5 V 13 V < UH < 30 V -11.5 mA < IL < 1.5 mA 4.5 mA < IH < 11.5 mA Ri = 2900 Ohms typ -1.5 V < UL < 2 V 4 V < UH < 5.5 V -2 mA < IL < 2.3 mA 4.8 mA < IH < 7.7 mA Ri = 750 Ohms typ
Input signals for Set - 24 V DC / 8.3 mA (24 V)	-30 V < UL < 5 V 13 V < UH < 30 V -11.5 mA < IL < 1.5 mA 4.5 mA < IH < 11.5 mA Ri = 2900 Ohms typ
Filter time constant - Inputs A and B	1 - 21’845 µs
Isolation - test voltage	opto-coupler, individually each input 500 V rms
Current consumption - typ. (1) - max. (2)	170 mA 205 mA
Power dissipation - typ. (3) - max. (4)	8 W 11 W

(1) Typical consumption from electronic power supply USA/USB.

(2) Max. consumption from electronic power supplies USA/USB at min. supply voltage and all inputs active.

(3) Total power dissipation at rated supply voltage.

(4) Total power dissipation at max. supply voltage and all inputs active.

Front view

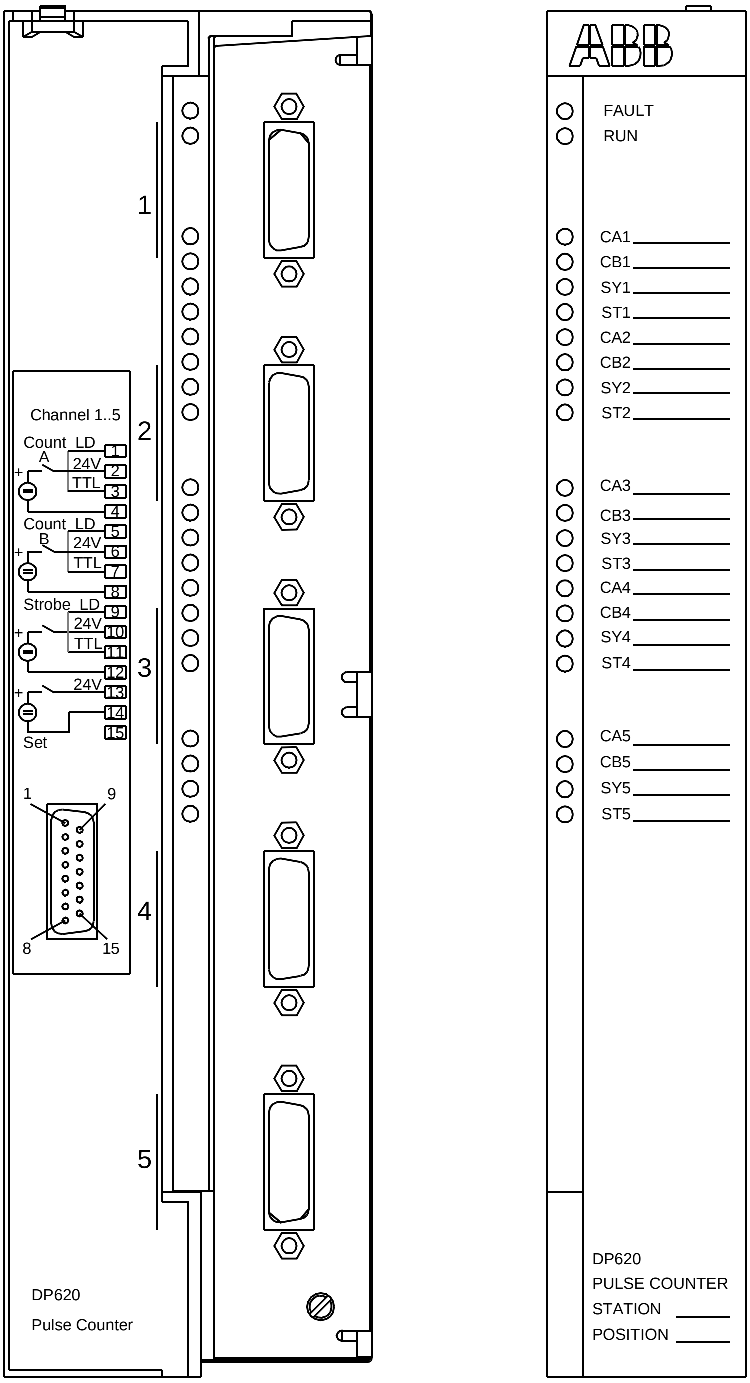


Figure 3-95. DP620 Front view

Process connections principles

Up-counting

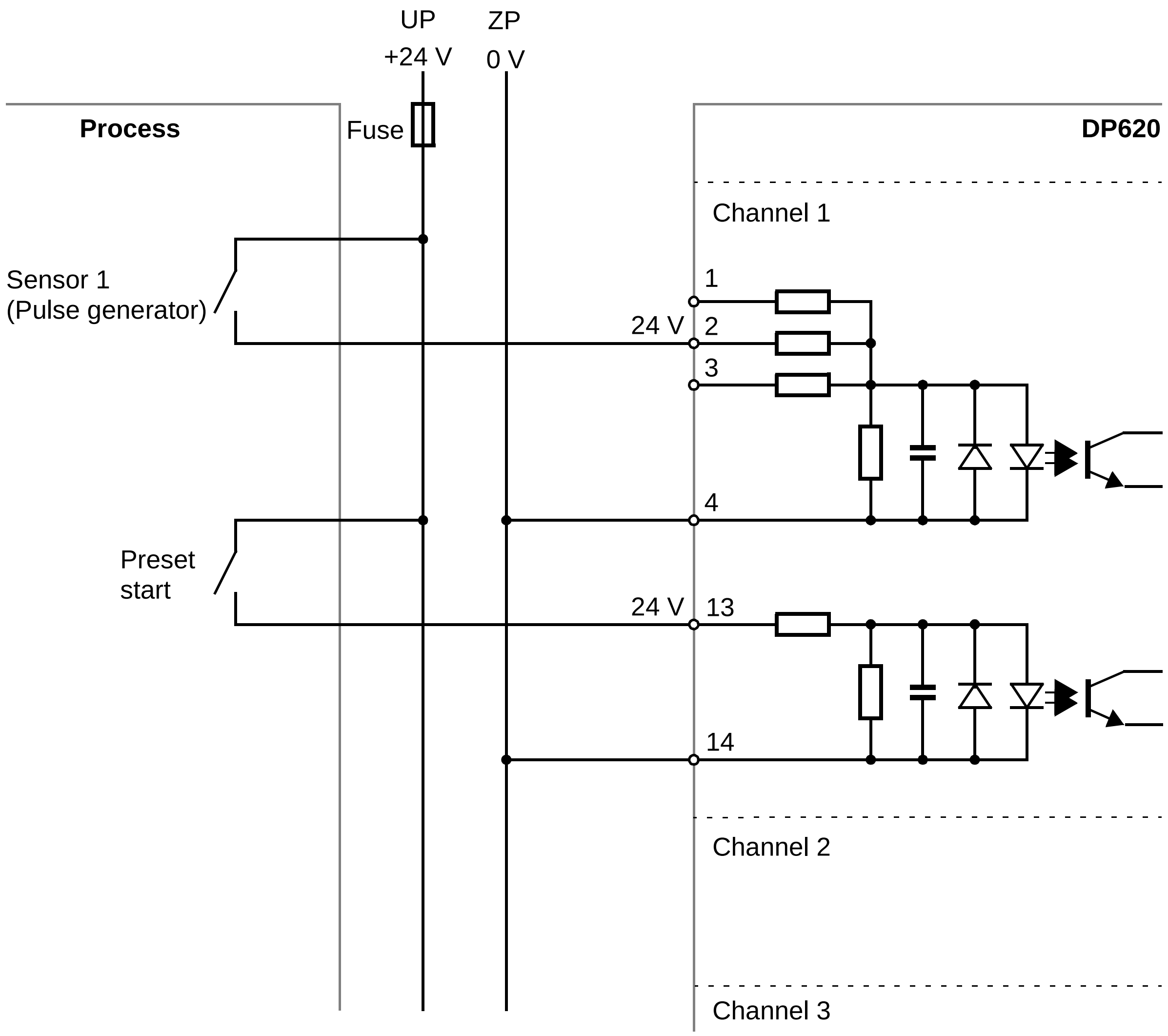


Figure 3-96. DP620, example of process connections

Position measurement

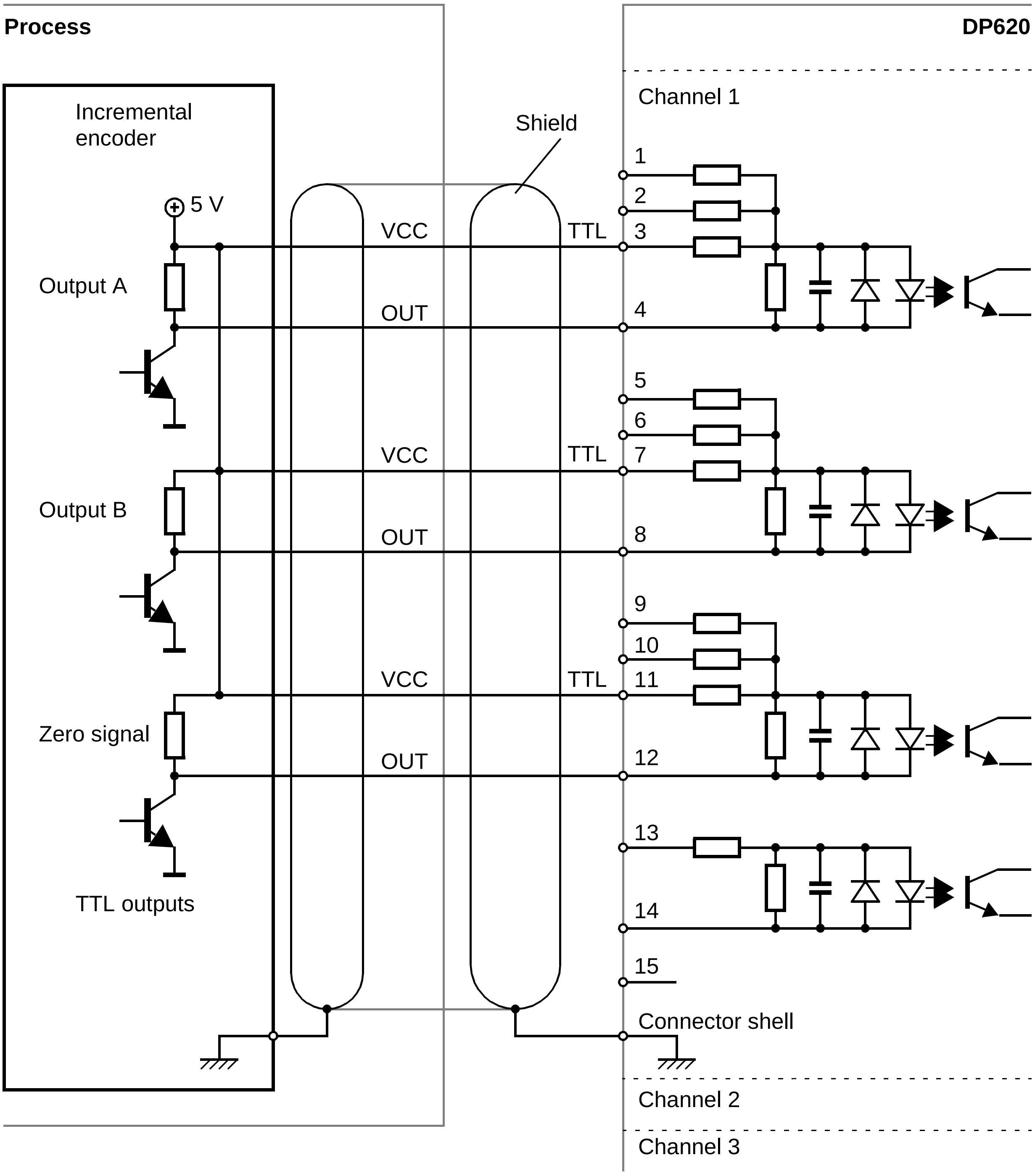


Figure 3-97. DP620, example of process connections

Technical description

The pulse counter module DP620 has five channels with four inputs each.

A green LED (RUN) on the front of the module indicates that the module is operating normally.

A red LED (FAULT) signals a severe fault.

Four yellow LEDs marked as follows display, for each counter, the active states of the input signals:

CA	counter input A (showing the logical active state)
CB	counter input B (showing the logical active state)
SY	synch, shows that a preset has occurred (prolonged to ca 0.5 s)
ST	input strobe (showing the logical active state).

Each counter has two counting inputs, A and B, and two auxiliary inputs, Strobe and Set. The latter are for setting or starting functions. You can select whether an input responds to a positive-going or negative-going edge.

In the operating modes “up-counting,” “up-/down-counting” and “position measurement,” you can specify a preset value and select different trigger combinations of the Strobe input and the Set input (synchronization). The other operating modes are initiated automatically.

One of three different kinds of signals can be selected for the counting inputs A and B and the Strobe input:

- 5 V DC line driver/13 mA current loop
- 24 V DC/8.3 mA
- 5 V DC TTL.

The Set input is designed for a 24 V DC signal.

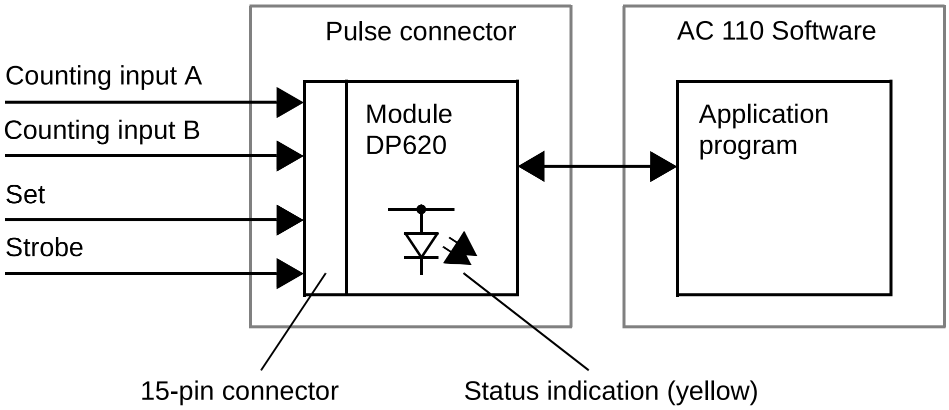


Figure 3-98. DP620 Block diagram

Operating modes

There are six possible operating modes a channel of DP620 can execute. The configuration is done via the channel data base element DPS620 that means that the channels are independent from each other.

Up-counting

An initial value <PRESet_VALue> can be set for the counter. When a signal is applied to the set input, the counter loads the value of the parameter <PRESet_VALue> and begins to count. The state of the parameter <EDGE_CA> determines whether the counter is incremented on each positive-going or each negative-going edge of the pulse signal at input A. If the parameter <DOUBLe_FRequency> is set, the counter is incremented by both edges, i.e., the counter counts at twice the frequency of the input signal. The counter reading is transferred to the process variable <VALUE> in the communication memory cyclically at a rate of approximately 5 ms.

Up-/down-counting

The function is the same as that of up-counting, with the exception that an edge applied to input B decreases the reading of the counter by one and an edge applied to input A increases the reading by one.

Frequency measurement

The frequency of the signal at input A is measured. During the measuring period, the reading of the measurement counter is incremented on each active edge of the pulse signal at input A. The polarity of the active edge is determined by the variable <EDGE_CA>. At the same time, the reading of the reference counter is incremented at the reference frequency (1 MHz) beginning at 0.

The measurement is terminated when the reference counter has reached the value of <PRESet_PULSes>. At this point, the reading of the measurement counter is transferred to the output terminal <VALUE>, the readings of both counters are reset and the next period of measurement begins.

The measuring period is: TM = <PRESet_PULSes> µs.

The corresponding frequency is given by: f = <VALUE> / TM

Difference measurement

This mode works in the same way as the frequency measurement mode, but with the difference that input B is used as input to the reference counter instead of the internal 1 MHz reference frequency.

At the beginning of the measurement, the readings of the measurement counter and the reference counters are reset. The measurement counter is then incremented for each active edge of the pulses at input A and the reference counter is incremented for each active edge of the pulses at input B. Both counters are stopped when the reference counter reaches the value <PRESet_PuLSes>. Then the reading of the measurement counter is transferred to the output terminal <VALUE>, the readings of both counters are reset and the measurement can start again.

Position measurement

The two signal outputs of an incremental encoder are connected to inputs A and B. These signals must be phase-shifted by 90°. You can use the inputs Set and Strobe, for example, to detect the zero-crossing signal and the zero-position signal for the measurement scale of the incremental encoder. By presetting the inputs appropriately, you can use these signals to control the counter(s).

At the instant of the SET command, the counter is set to the value of the parameter <PRESet_VALue> and the measurement begins. During the measurement, each edge (positive- and negative-going) at the two inputs A and B generates pulses, which are counted by the measurement counter. The sign of the phase shift between the two signals determines whether the counter is incremented or decremented. The counter, therefore, counts at a rate of four times the frequency of the signals of the incremental encoder.

The reading of the counter is transferred cyclically, approx. every 5 ms, to the output terminal <VALUE>.

Speed of rotation measurement

This mode of operation is designed for highly accurate, fast measurement of signal frequencies. The measurement begins on the active edge of a pulse at input A. During the measurement, the measurement counter is incremented by the reference clock. Starting at zero, the reading of the reference counter is simultaneously incremented on each active edge of the pulses at input A.

The measurement ends on the first active edge at input A after the measurement counter exceeds 10000 (= 10 ms minimum measurement time). The speed is calculated as the period time of the signal at input A in ns and transferred to the output terminal <VALUE>. Both counters are then reset, and the next measurement period begins on the active edge of a pulse at input A.

An accuracy of 200 ppm and, for input frequencies from 50 Hz to 100 kHz, a measurement period of 20 ms, can be achieved. For frequencies lower than 50 Hz, the measurement period increases proportionally to the signal period. The maximum measurement period can be determined by the parameter <MAX_TIME> (time in µs with a setting range of 20’000 - 2'100’000 (µs) and a default setting of 1'000'000 µs). If the measurement period exceeds <MAX_TIME>, 0 is written to <VALUE> and the measurement starts again.

The frequency can be calculated by: f = 1/<VALUE>.

Presetting the counters

In the operating modes “up-counting,” “up-/down-counting” and “position measurement,” you can preset the counter (to the predefined value of the parameter <PRESet_VALue>) and start it (SET command) by several events. There are 10 events which initiate presetting the counters (synchronization). They are determined by the signals at the process inputs Set and Strobe and are described in the following timing diagrams.

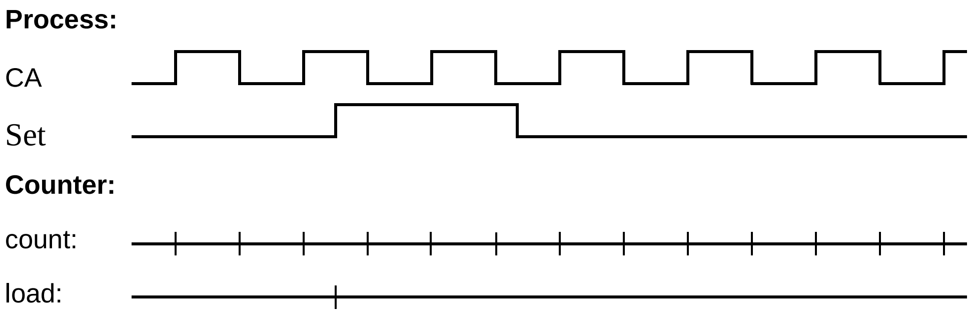
The meaning of the signals is as follows:

- A, B, Set, Strobe: signals at the corresponding channel inputs
- Dir: indicates whether the counter is counting upwards (Dir = 1) or downwards (Dir = 0)
- Count: pulses counted by the measurement counter
- Load: indicates presetting of the counter (synchronization).

Examples of the 10 possible events for synchronization of the counter (definable at the PRES_CON terminal of DPS620).

1. SET

Example of a configuration: <MODE> = Up-counting
<DOUBLe_FRequency> = on

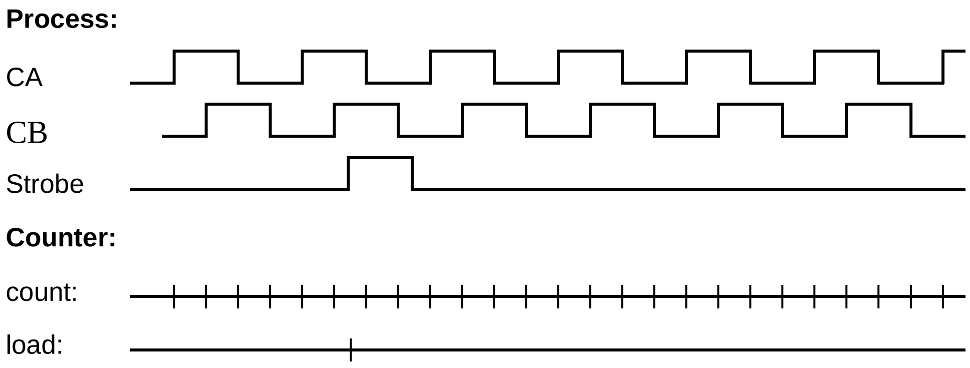


The counter is preset and started at the first edge of SET. Counting is always enabled.

Operating modes:32 bit up-counting, Up-/down-counting, position measurement

2. STROBE

Example of a configuration: <MODE> = Position

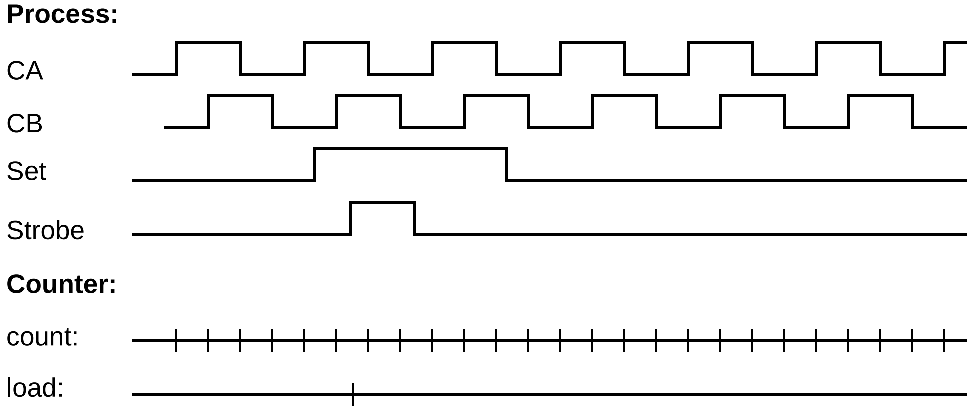


The counter is preset and started by the first edge of Strobe. Counting is always enabled.

Operating modes:Up-counting, Up-/down-counting, position measurement

3. SET and STROBE

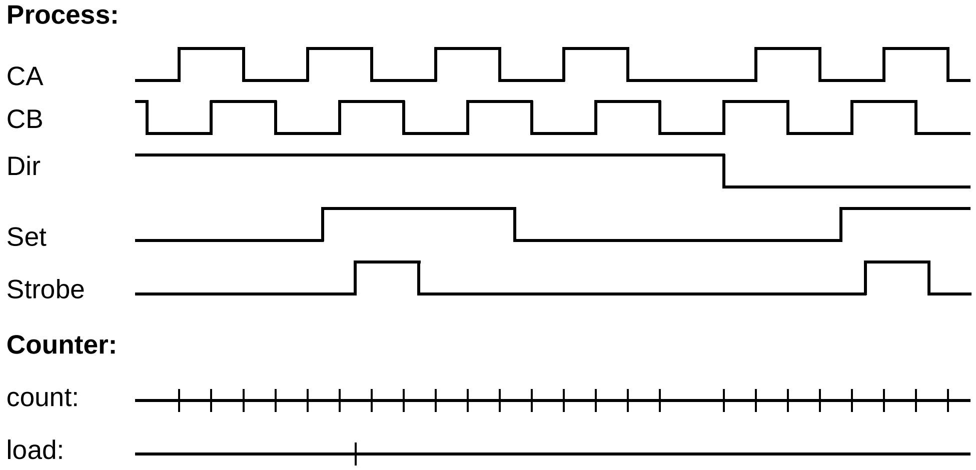
Example of a configuration: <MODE> = Position



The counter is preset and started by the first edge of the load signal, which is the coincidence of Set and Strobe signals. Counting is always enabled.

Operating modes:Up-counting, up-/down-counting, position measurement

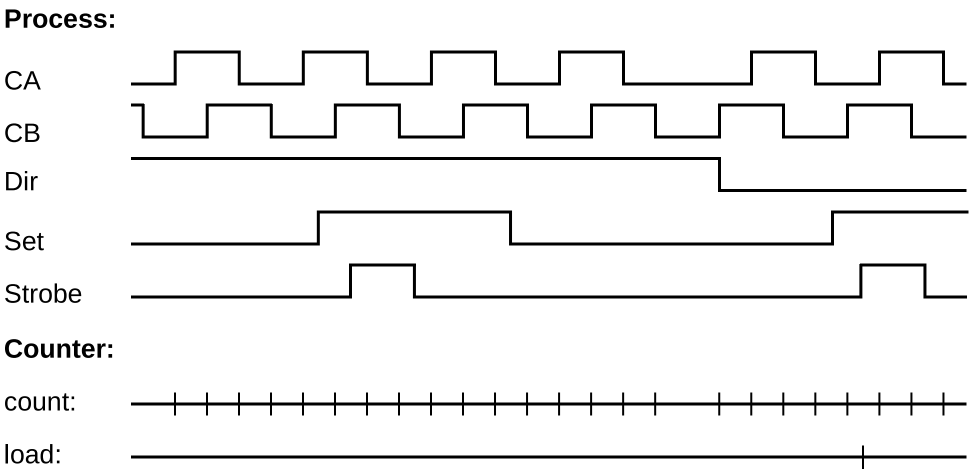
4. SET and STROBE and UP



The counter is preset and started by the first edge of the load signal, which is the coincidence of Set and Strobe signals while counting upwards. Counting is always enabled.

Operating mode:Position measurement

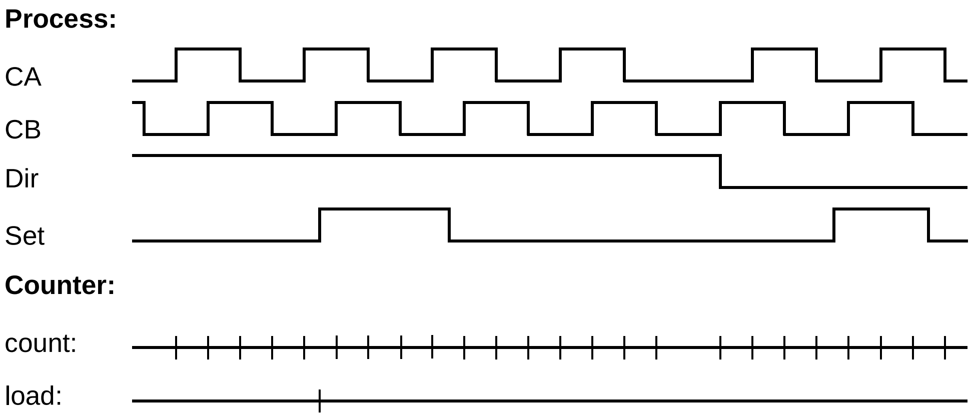
5. SET and STROBE and DOWN



The counter is preset and started by the first edge of the load signal, which is the coincidence of Set and Strobe signals while counting downwards. Counting is always enabled.

Operating mode:Position measurement

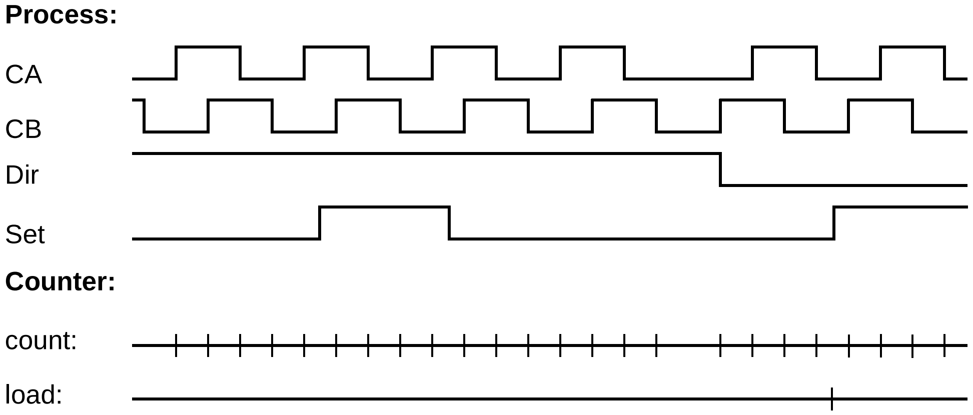
6. SET and UP



The counter is preset and started by the first edge of the Set signal while counting upwards. Counting is always enabled.

Operating mode:Position measurement

7. SET and DOWN

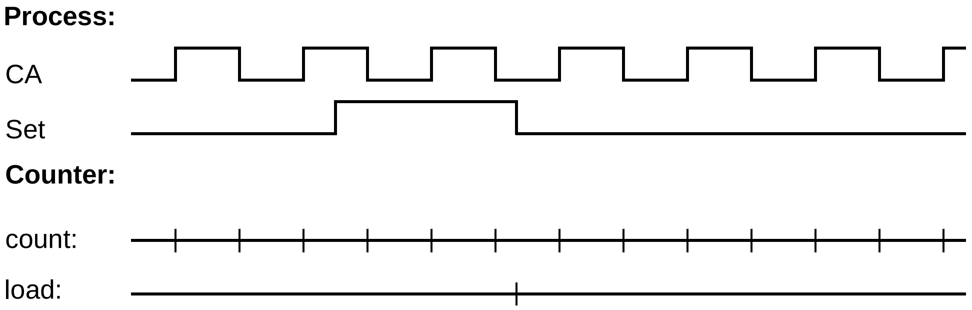


The counter is preset and started by the first edge of the Set signal while counting downwards. Counting is always enabled.

Operating mode:Position measurement

8. SET (negative-going edge)

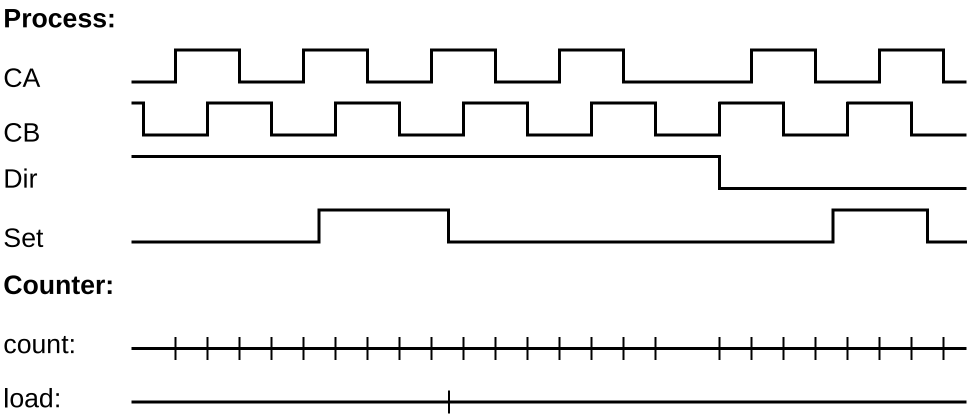
Example of a configuration: <MODE> = Up counting
<DOUBLe_FRequency> = 1 (on)



The counter is preset and started by the second edge of the Set signal. Counting is always enabled.

Operating modes:Up-counting, up-/down-counting, position measurement

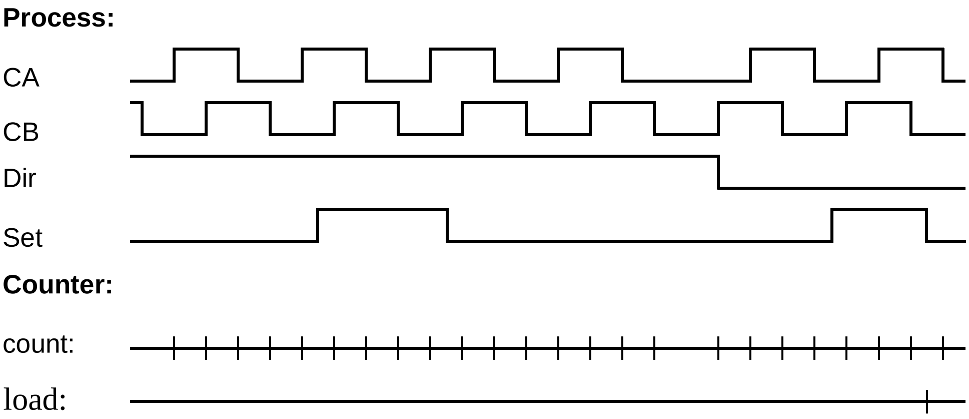
9. SET (negative-going edge) and UP



The counter is preset and started by the second edge of the Set signal while counting upwards. Counting is always enabled.

Operating mode:Position measurement

10. SET (negative-going edge) and DOWN



The counter is preset and started by the second edge of the Set signal while counting downwards. Counting is always enabled.

Operating mode:Position measurement

Configuration of the counter via the parameters of the data base element

The configuration is done with the channel element, that means channelwise.

The following parameters must be defined in order to configure the channel:

ACT <Channel ACTive>

This parameter determines whether the corresponding channel is used or not.

Range: on/off

Default: on (1)

FILT_VAL <FILTer_VALue>

Determines the time constant of the digital filter. Pulses up to a maximum length of (<FILTer_VALue> ± 33%) µs are suppressed by the filter.

Range: 1 - 21’845 (µs)

Default: 10 (µs)

DOUBL_FR <DOUBLe_FRequency>

This parameter determines whether the counters should count both positive- and negative-going edges (up-counting and up-/down-counting).

Range: on/off

Default: on (1)

<EDGE_CA> and <EDGE_CB>

These parameters define the active edge of CA and CB.

Range: Positive-going edge/negative-going edge

Defaults: Positive-going edge (rising)

<EDGE_SET> and <EDGE_STR>

These parameters define the active edge of SET and STROBE.

Range: Positive-going edge/negative-going edge

Defaults: Positive-going edge (rising)

<MODE>

This parameter determines the operating mode of the corresponding channel.

Range: Up-counting, up-/down-counting, frequency measurement, difference measurement, position measurement, speed of rotation measurement

Default: Up-counting

PRES_CON <PRESet_CONdition>

This parameter determines how the counter is preset.

Range: SET, STROBE, SET and STROBE, SET and STROBE and UP, SET and STROBE and DOWN, SET and UP, SET and DOWN, SET (negative-going edge); SET (negative-going edge) and UP; SET (negative-going edge) and DOWN.

Default: SET

PRES_VAL <PRESet_VALue>

Upon the occurrence of the SET command, this 32-bit value is loaded into the counter as the initial value.

Range: Long integer type

Default: 0

PRES_PLS <PRESet_PuLSes>

This 32-bit value determines the limit reading of the reference counter at which the measurement counter is stopped. This value enables you to choose the measurement period in the modes “frequency measurement” and “difference measurement.”

Range: 3 - 2’147’483’647 (µs)

Default: 1000 (µs)

<MAX_TIME>

This value determines the maximum measurement period [µs] (“speed of rotation measurement”).

Range: 20'000 - 2'100'000 (µs)

Default: 1'000'000 (µs)

<CM_UPDATe>

This determines how the dynamic values in the communication memory are updated.

Range: Cyclic / Set

Default: Cyclic

For further information see Data Base Elements Advant Controller 100 Series Reference Manual.

Input characteristics

The input module DP620 is equipped with five channels. Each channel has four inputs: A, B, Strobe and Set. Allowed voltages for A, B and Strobe are: 5 V Line driver or ±13 mA, 24 V DC and 5 V TTL. The input voltage for Set is 24 V DC. The inputs are isolated individually via opto-couplers.

3.28 RB601

Summary

The dummy module RB601 is used to close a position in a subrack, which is not used by other modules.

This is to give the subrack a propper appearance and as a protection against something falling into the subrack.

Associated data base elements

None.

Module replacement

The module has no logical or electrical function, so there is no need to replace it.

3.29 RC 610

Description

The cable duct RC610 can (optionally) be attached to a subrack.

The duct is of sheet steel with mounting holes for self-tapping screws to attach it to the subrack. This connection is mechanically rigid and well grounded. You can also mount this combination of subrack and duct in a 19-inch rack. The cable duct has a plastic cover which, when opened, gives access to the cables. Holes for self-tapping screws are provided inside the duct, which should be used for terminating the cable screens (see Figure 3-99).

Technical data

Mounting:	Wall or 19-inch cabinet
Dimensions:	482 x 100 x 325 mm
Weight:	2.5 kg.

Oblique view

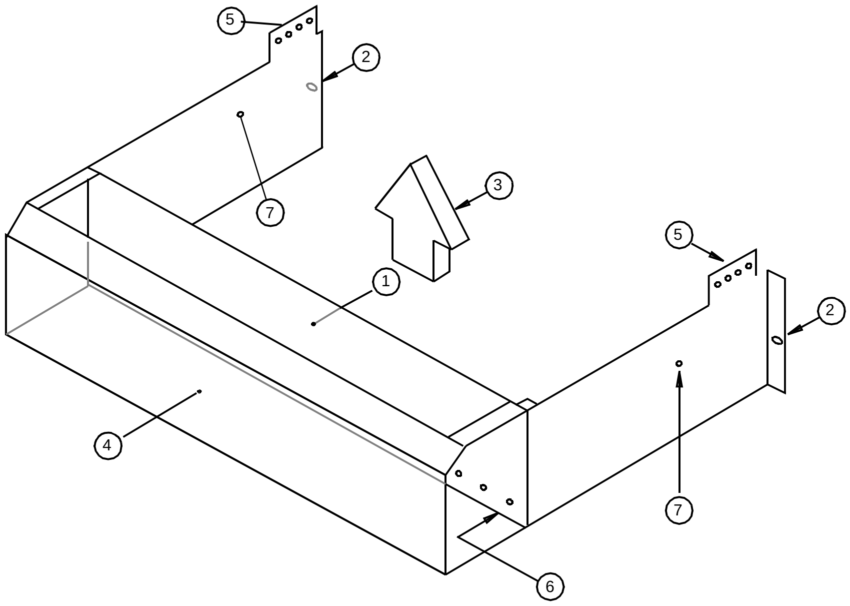


Figure 3-99. RC610 Oblique view

1) Sheet steel cable duct5) Subrack mounting holes

2) Mounting holes 6) Screw holes for screen grounding

3) Ventilation opening 7) Pivot holes for heat deflection plate

4) Front door

3.30 RC620

Summary

The fan unit RC620 is used to provide forced cooling for the modules in a subrack.

Associated data base elements

None.

Module replacement

Do not replace the fan unit while supply voltage is applied in the station. Switch off the mains supply of the **whole** station before you replace the fan unit.

Front view

Not available at the time of printing.

Connections

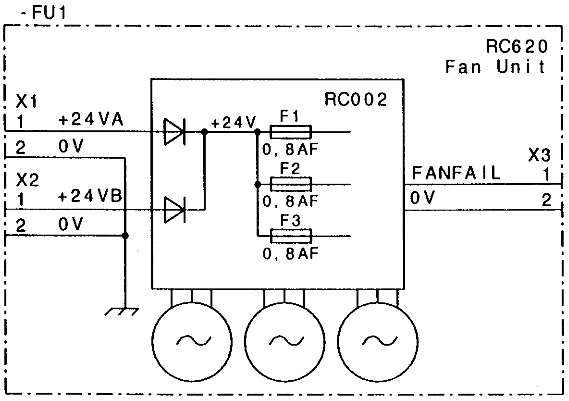


Figure 3-100. RC620 connections

Output FANFAIL

FANFAIL indicates whether 1 or more fans failed. FANFAIL uses a short circuit proof 24V active signal that can be used as an input signal for a digital input module.

Logical “1“ corresponds to 16.3 - 32 V. The output current is 5 - 15 mA.

Table 3-35. Meaning of logical levels of signal FANFAIL

Logical level	Meaning
0	All fans are OK
1	At least 1 fan failed

Description

The fan unit RC620 is used to provide forced cooling for the modules in a subrack.

Forced cooling using a fan unit is required if the ambient temperature below a subrack exceeds +45 degrees Celsius.

A cabinet with a basic and an extension subrack normally requires a fan unit with the upper subrack in order to keep the ambient temperature of the upper subrack within the specified limits.

There are redundant power supply lines, 24VA (X1) and 24VB (X2). Each fan supply is individually fused (0.8AF).

The 0V input is directly grounded to chassis, and the outputs include no glavanic isolations.

3.31 RF615

Summary

The basic subrack RF615 is used to house and to interconnect the modules of Advant Controller 110 and of the S600 I/O. Unlike the extension subrack, it has a station address switch and it has dedicated (special) positions for modules like PM632, CI610 and CI626.

The subrack and cable duct assembly for the Advant Controller 110 is designed to be mounted on a wall, but it can also be fitted in a cabinet with a 19-inch rack conforming to IEC 297 - 1. The design is not confined to any particular cabinet and the minimum size is determined by the number of cables and marshalling.

Functional description

The RF615 is the basic subrack of an AC110 station. It has two dedicated positions:

- Position 1 is reserved for the processor module or for the bus extender module CI610.
- Position 2 is reserved for the AF100 communication module (CI626 or CI627) or for the bus extender module CI615.
  If position 2 is occupied by an AF100 communication module, the bus extender module CI615 can be located in position 3.

The subrack has 10 positions, so it can accommodate a processor module or a bus extender module CI610 (position 1) and nine I/O modules as maximum configuration.

A code switch for setting the station address is located on the left-hand side of the basic subrack. A 25-pole sub-D bus connector for an extension subrack is also located on the left-hand side of the basic subrack. On the right-hand side, there are four terminals (USA/ZD, USB/ZD) for the 24 V station voltage power supply.

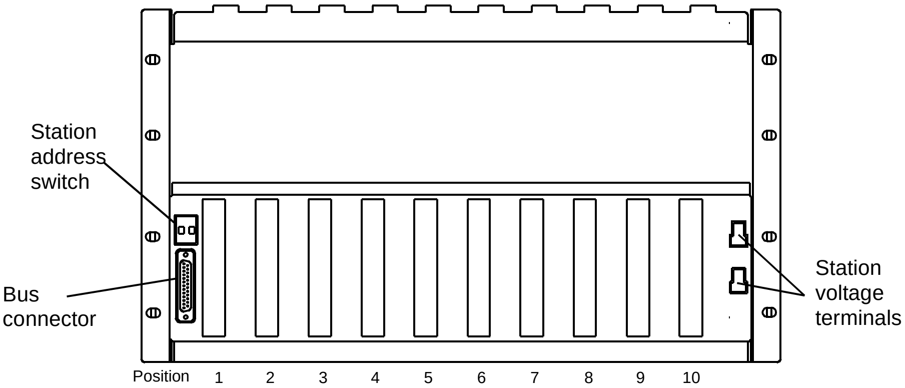


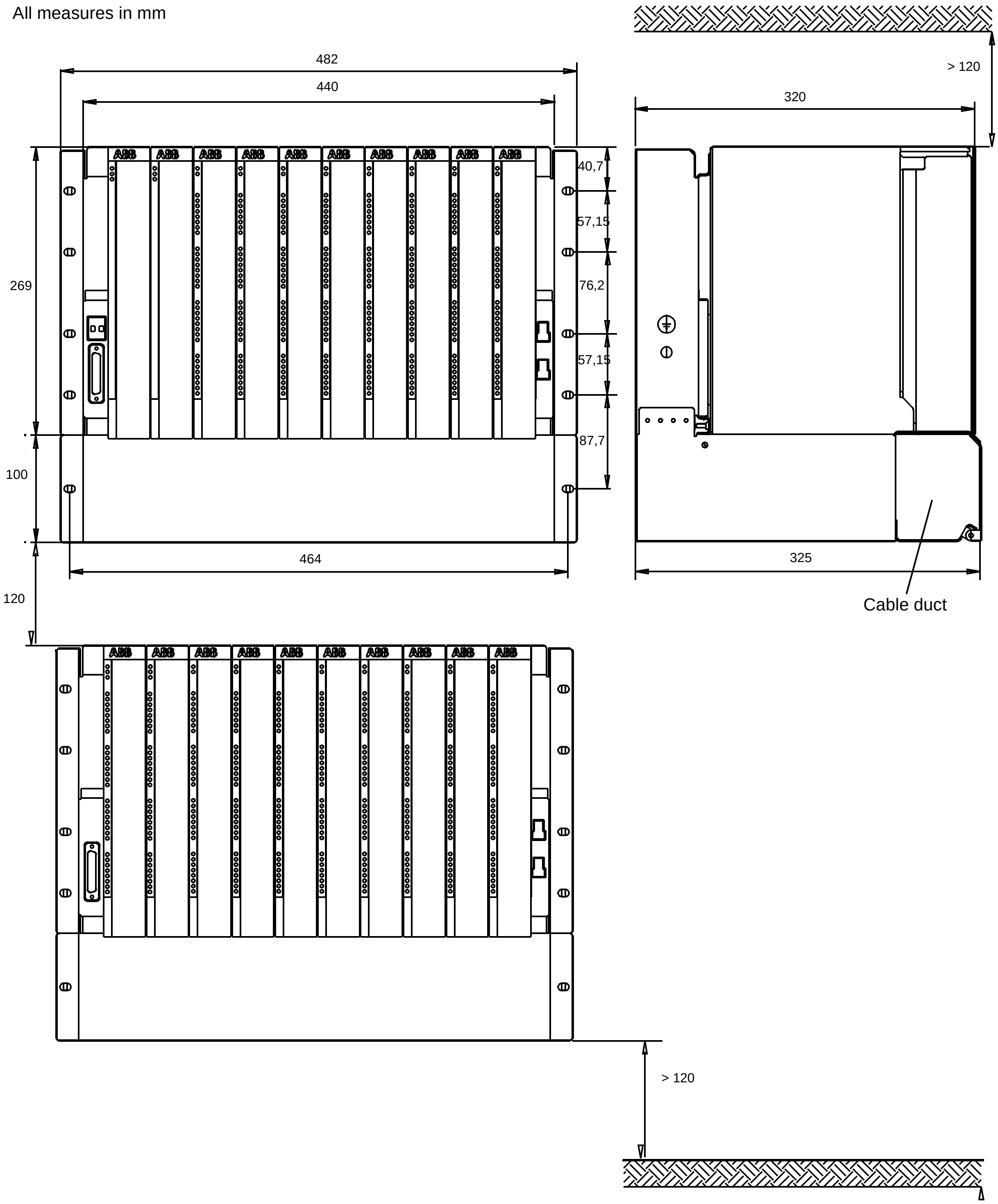
Figure 3-101. Basic subrack RF615

Position 1:	Processor module or bus extender CI610
Position 2:	AF100 communication module CI626/CI627
Position 3:	Bus extender CI615
Position 4 - 9:	Other communication interfaces or I/O modules
Position 10:	Power supply module SA610

Dimensions

RF615 has a width of 482 mm, which conforms to the 19-inch standard, and a depth of 325 mm, so it can be installed in a cabinet 400 mm deep (internal depth not less than 330 mm). The height of the subrack itself is 269 mm. The cable duct RC610 adds a further 100 mm to the height. In order to insert and withdraw I/O modules, a minimum space of 120 mm above the subrack is required. A space of 120 mm below the subrack should be left for ventilation purposes.

The basic subrack RF615 and the extension subrack RF620 are designed for installation one above the other. For installation one above the other an additional space of 120 mm to the space below the one and above the other is to be left. Therefore the resulting total height requirement is 1100 mm. All cables and mounting accessories are designed for subracks installed one above the other. Side-by-side or back-to-back mounting is not possible.



All measures in mm

Figure 3-102. Subrack with cable duct and modules

Mechanical description

The base plate of the subrack is made of sheet steel. The printed circuit board (PCB), with the connectors and the electrical circuits, is mounted on the base plate and covered with a second steel plate. The subrack provides grounding.

The subrack can be mounted directly on a wall or on a rail. The dimensions of the mounting holes are in accordance with IEC 297-1 (19-inch series). The subrack can also be mounted in a 19-inch rack.

On both sides of the subrack, there are holes that measure 7 mm in diameter. The protective earth conductor (PE) can be connected to one of them in case the connection is not made via the mounting rails.

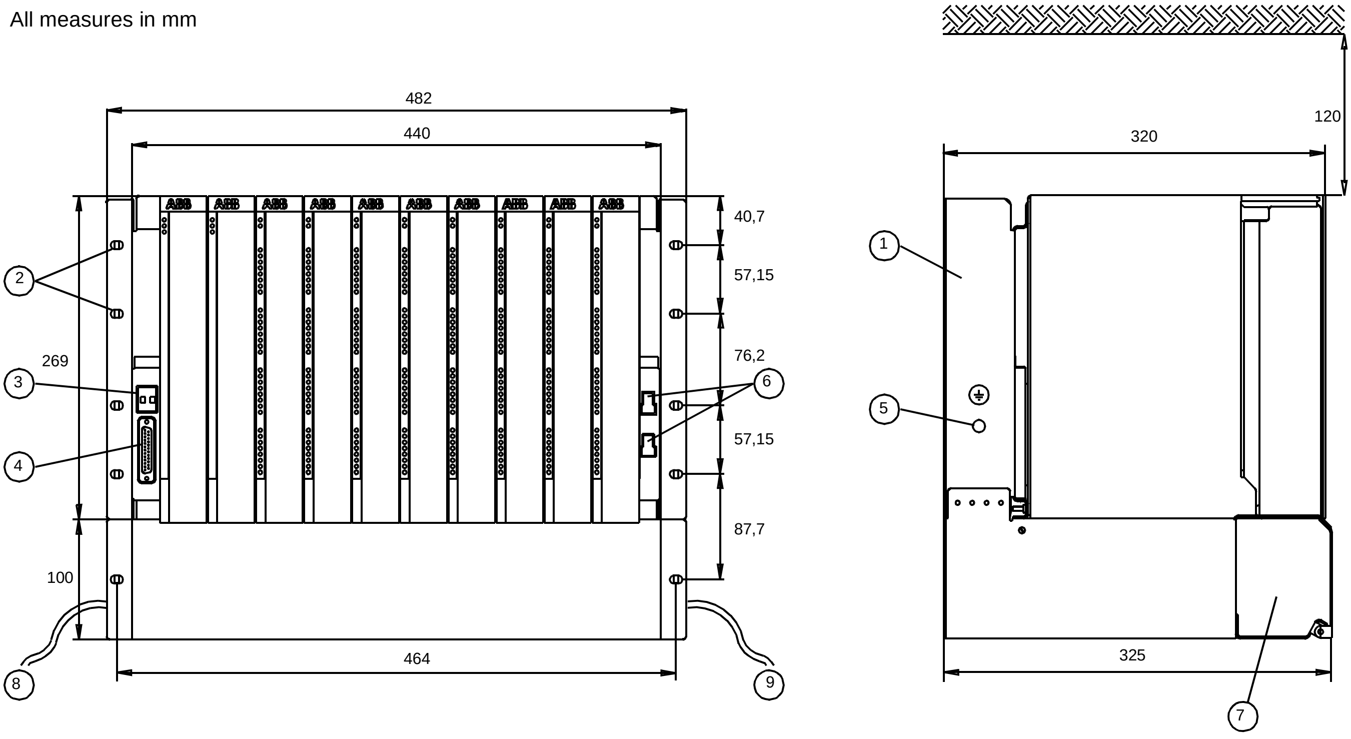


Figure 3-103. Mechanical parts of the subrack including cable duct

1) Steel subrack plate
2) Mounting holes for 19-inch rack
3) Station address switch
4) Bus connector
5) Hole to secure protective earth conductor (PE)
6) USA, USB terminals
7) Cable duct
8) Communication cables
9) Process cables

At the right side of the subrack there are two sets of terminals enabling the connection of two power supplies (USA and USB). PCB supply rails connect both sets of terminals to all positions. If the AC110 station is configured with one basic subrack and one extension subrack the voltage terminals of both subracks have to be interconnected to enable proper operation of the system.

The subrack must be earthed via a protective earth conductor (PE). In installations with basic and extension subracks both subracks have to be connected to PE.

The rated supply voltage for the modules in the station is 24 V DC. The permissible range of supply voltage is 18 - 30 volts measured at the terminals.

The positions in the basic subrack RF615 are numbered 1 to 10. The position numbers printed on the subrack correspond to the geographical addressing encoded in the subrack connectors. The address of a module is set by its position in the subrack (no address strapping is necessary).

The subrack connectors in positions 3 to 10 are 32-pole DIN F-connectors. The connectors in positions 1 and 2 (48-pole DIN F-connectors) include additional signals required for the processor module and communication interface. Preferably, the bus extender CI615 in the basic station is placed in position 2. If position 2 is already occupied by another interface, position 3 has to be used.

Technical data

Subrack RF615

Type:	Basic subrack
No. of positions:	10
Purpose:	Processor module, communication modules, SA610 and I/O modules
Mounting:	Wall or 19-inch cabinet
Dimensions:	482 x 269 x 325 mm
Weight:	2.5 kg.

3.32 RF620

Summary

The extension subrack RF620 is used to house and to interconnect the modules of the S600 I/O. Unlike the basic subrack, it has no station address switch and no dedicated positions.

The subrack and cable duct assembly for the Advant Controller 110 is designed to be mounted on a wall, but it can also be fitted in a cabinet with a 19-inch rack conforming to IEC 297 - 1. The design is not confined to any particular cabinet and the minimum size is determined by the number of cables and marshalling.

Functional description

The RF620 is an optional extension subrack for I/O modules. It can only be used as such because it does not have dedicated positions for processor module, communication module or bus extender and it is not equipped with a code switch. On the left-hand side of the extension backplane, there is a 25-pole sub-D connector for the bus connection to a basic subrack.
As with the basic subrack, the extension subrack has 10 positions and 10 additional modules can be fitted. A basic station comprising an RF615 and an RF620 can accommodate 20 modules.

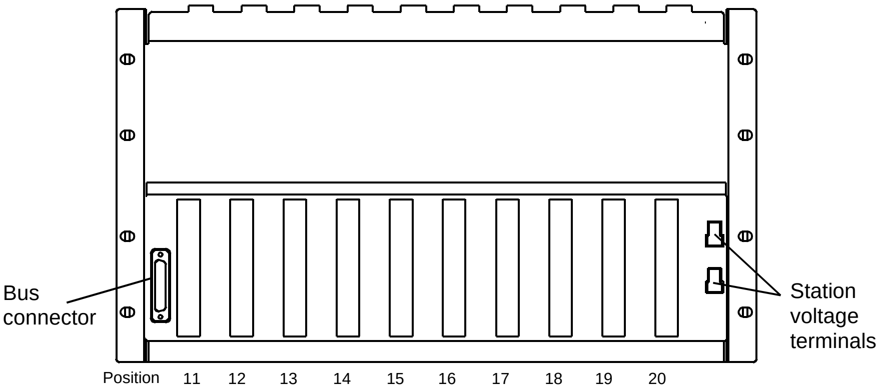
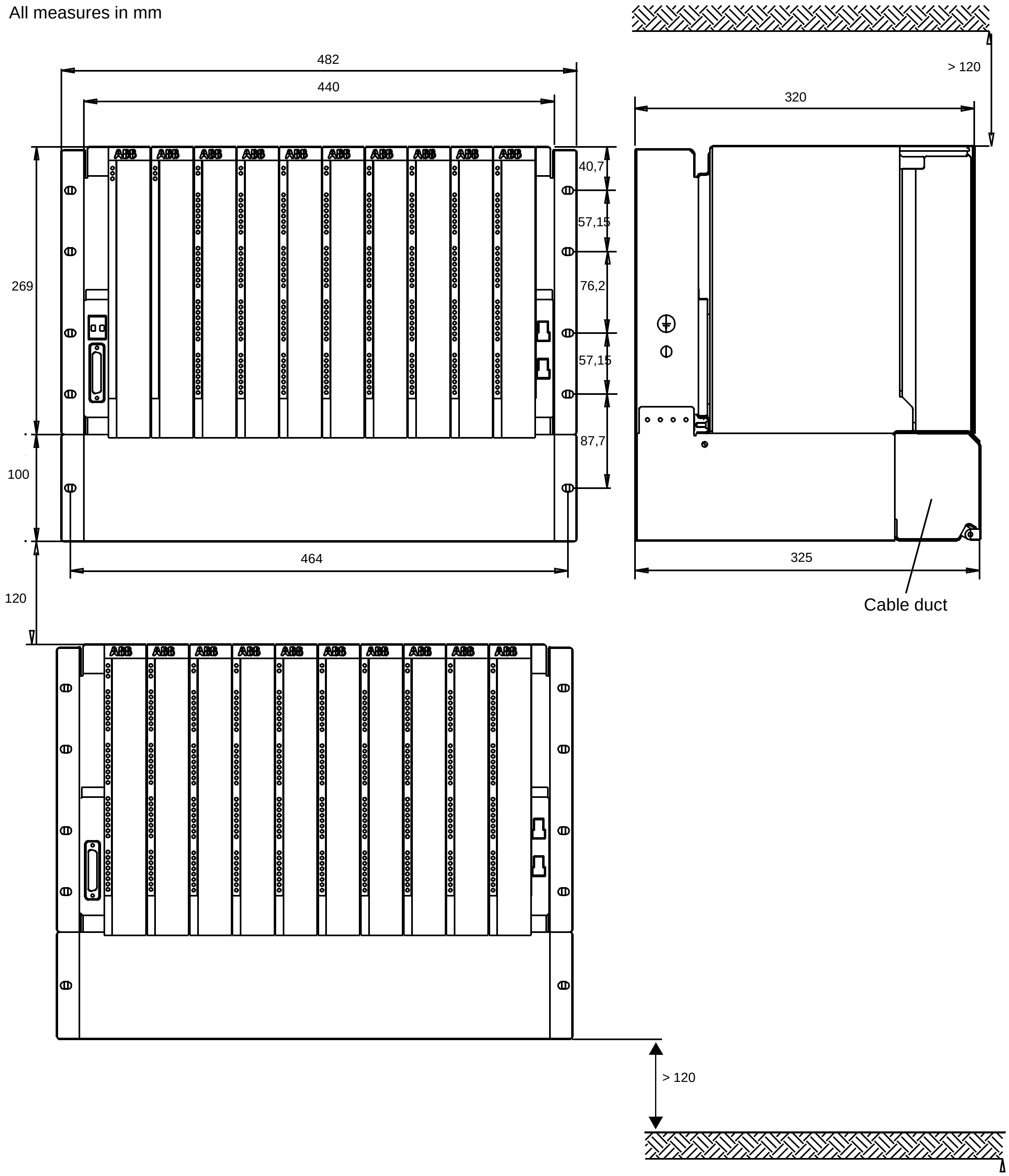


Figure 3-104. Extension subrack RF620

Dimensions

RF620 has a width of 482 mm, which conforms to the 19-inch standard, and a depth of 325 mm, so it can be installed in a cabinet 400 mm deep (internal depth not less than 330 mm). The height of the subrack itself is 269 mm. The cable duct RC610 adds a further 100 mm to the height. In order to insert and withdraw I/O modules, a minimum space of 120 mm above the subrack is required. A space of 120 mm below the subrack should be left for ventilation purposes.

The basic subrack RF615 and the extension subrack RF620 are designed for installation one above the other. For installation one above the other an additional space of 120 mm to the space below the one and above the other is to be left. Therefore the resulting total height requirement is 1100 mm. All cables and mounting accessories are designed for subracks installed one above the other. Side-by-side or back-to-back mounting is not possible.



All measures in mm

Figure 3-105. Subrack with cable duct and modules

Mechanical description

The base plate of the subrack is made of sheet steel. The printed circuit board (PCB), with the connectors and the electrical circuits, is mounted on the base plate and covered with a second steel plate. The subrack provides grounding.

The subrack can be mounted directly on a wall or on a rail. The dimensions of the mounting holes are in accordance with IEC 297-1 (19-inch series). The subrack can also be mounted in a 19-inch rack.

On both sides of the subrack, there are holes that measure 7 mm in diameter. The earth/ground conductor can be connected to one of them in case the earth/ground connection is not made via the mounting rails.

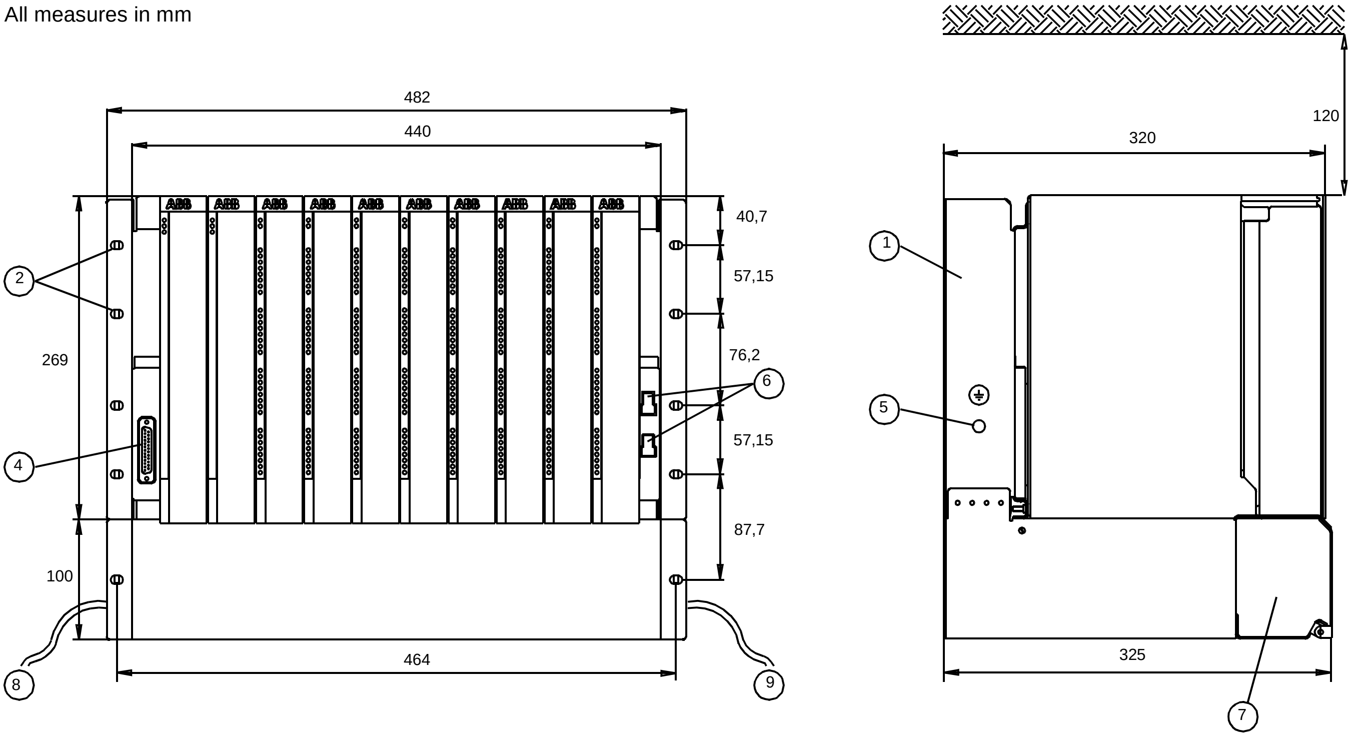

All measures in mm

Figure 3-106. Mechanical parts of the subrack including cable duct

1) Steel subrack plate
2) Mounting holes for 19-inch rack
4) Bus connector
5) Hole to secure protective earth conductor (PE)
6) USA, USB terminals
7) Cable duct
8) Communication cables
9) Process cables

At the right side of the subrack there are two sets of terminals enabling the connection of two power supplies (USA and USB). PCB supply rails connect both sets of terminals to all positions. If the AC110 station is configured with one basic subrack and one extension subrack the voltage terminals of both subracks have to be interconnected to enable proper operation of the system.

The subrack must be earthed via a protective earth conductor (PE). In installations with basic and extension subracks both subracks have to be connected to PE.

The rated supply voltage for the modules in the station is 24 V DC. The permissible range of supply voltage is 18 - 30 volts measured at the terminals.

The positions in the extension subrack RF620 are numbered 11 to 20. The position numbers printed on the subrack correspond to the geographical addressing encoded in the subrack connectors. The address of a module is set by its position in the subrack (no address strapping is necessary).

The subrack connectors in positions 11 to 20 are 32-pole DIN F-connectors.

Technical data

Subrack RF620

Type:	Extension subrack
No. of positions:	10
Purpose:	I/O modules and SA610
Mounting:	Wall or 19-inch cabinet
Dimensions:	482 x 269 x 325 mm
Weight:	2.5 kg.

3.33 SA610

Summary

The power supply module SA610 is designed to supply an Advant Controller 110 station. It is capable of supplying a typical station which includes up to 20 modules. The rated input voltage is 110 to 240 V AC (single-phase) or 110 to 250 V DC. The output voltage is 24 V DC (unstabilized). The maximum output power is 60 W.

The SA610 provides reinforced primary voltage insulation, includes excellent EMI filters and can buffer short primary voltage drop-outs.

Each subrack can accommodate a maximum of two SA610 so that, if the power requirement of an AC110 station exceeds the capacity of one SA610 module, further modules can be added up to a total of four SA610 modules for a station with two subracks.

If an AC110 station consists of two subracks (basic and extension subrack), the station voltage terminals of both subracks must be interconnected by the station voltage cables TK615.

NOTE

The station does not work reliably if you omit this connection.

The SA610 is intended to supply the modules of the AC110 station, so it‘s not allowed to use it for the supply of field devices.

Associated data base elements

None.

Module replacement

When you replace a power supply module SA610, it is safer to switch off the central mains supply (AC/DC) feeding SA610. This does not necessarily mean that you must switch off the complete AC 110.

NOTE

If the power supply module is in an I/O station, then you need only switch off this station (if this is not already the case). The rest of the system can remain in operation.

Follow this procedure to replace a faulty or suspect power supply module SA610:

- Switch off mains supply to the power supply module.
- Open the front door of the module and check that the mains voltage is off. The LED (U_{in}) must not be lit.
- Release the screws on the mains connector “INPUT” and the indication connector “OUTPUT ANNUNCIATOR” and remove both connectors.
- Release the screw securing the module until it turns freely and withdraw the power supply module from the backplane.

- Check that the jumpers (USA, USB) on the new module are in the correct positions (same positions as on the old module).
- Insert the new module and tighten the module-securing screw. Fit the mains cable and the indication cable and tighten their securing screws.
- Switch on the mains supply (LED Uin lights up) and switch on the power supply module (I/O switch). If the module is operating correctly, the green LED (RUN) lights up and the red LED (FAULT) stays dark.

Technical data

Table 3-35. SA610 Technical data

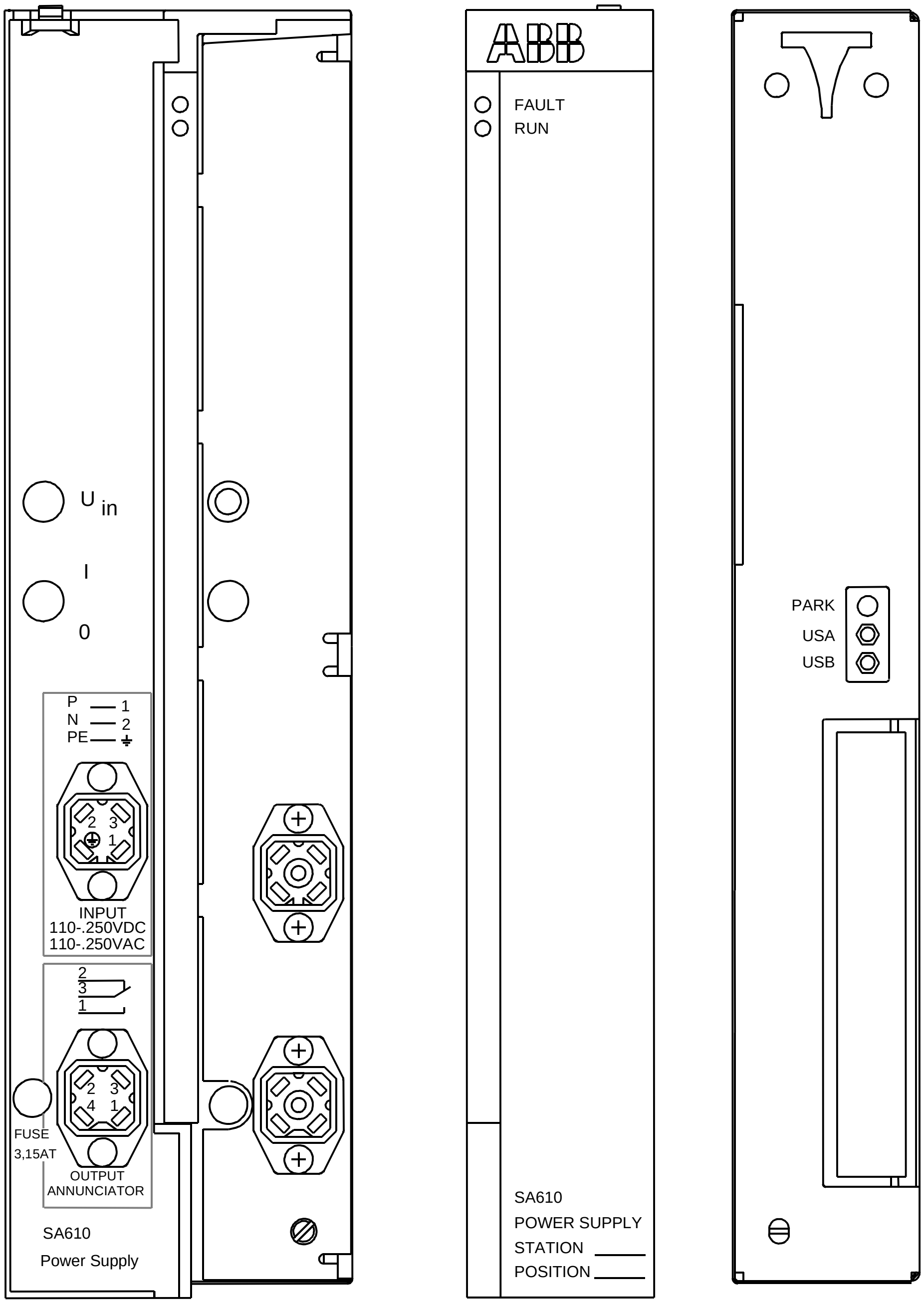
Power supply module	SA610
Input voltage	
AC rated voltage	110 - 240 V AC, 47 - 450 Hz
DC rated voltage	110 - 250 V DC
AC input voltage range	93.5 - 264 V AC, min. 88 V AC for 20 ms
DC input voltage range	82.5 - 312.5 V DC
Mains interruption buffering	min. 10 ms for 110 V DC and 60 W typ. 12 ms for 110 V DC 65 ms for 220 V DC 85 ms for 250 V DC typ. 20 ms for 110 V AC, 50 Hz 30 ms for 120 V AC, 50 Hz 140 ms for 230 V AC, 50 Hz 160 ms for 240 V AC, 50 Hz
Input current	
Switching on current	< 30 A
Internal fuse	3.15 AT
External fuse	6 A (slow)
Output voltage	
Rated voltage	24 V DC
Tolerance	22.8 - 25.2 V DC (1)
Maximum output power	60 W
Maximum output current	2.5 A at 24 V DC
Maximum short-circuit current	6 A
Efficiency, typical	80%
Load distribution with parallel power supplies	40%/60%
Electrical insulation between input and output	reinforced according DIN VDE 0160
Relay contact	
Maximum voltage	250 V DC/AC
Maximum current	2 A DC/AC
Maximum DC switching power	40 W

Table 3-35. SA610 Technical data

Power supply module	SA610
Connector INPUT	
Plug with mains cable	3BHT 310 358 R1
Cable	3 x 1 mm^2
Cable length	3 m
Connector OUTPUT ANNUNCIATOR	
Plug with cable	3BHT 310 359 R1
Cable	3 x 1 mm^2
Cable length	3 m
Weight	1.5 kg

(1) 18-30 V are required by the other modules.

Front and rear views



Front door open

Front door closed

Rear view

Figure 3-107. SA610 Front and rear views

Connections

The following figures illustrate two examples of possible configurations:

- Single configuration
- Parallel configuration.

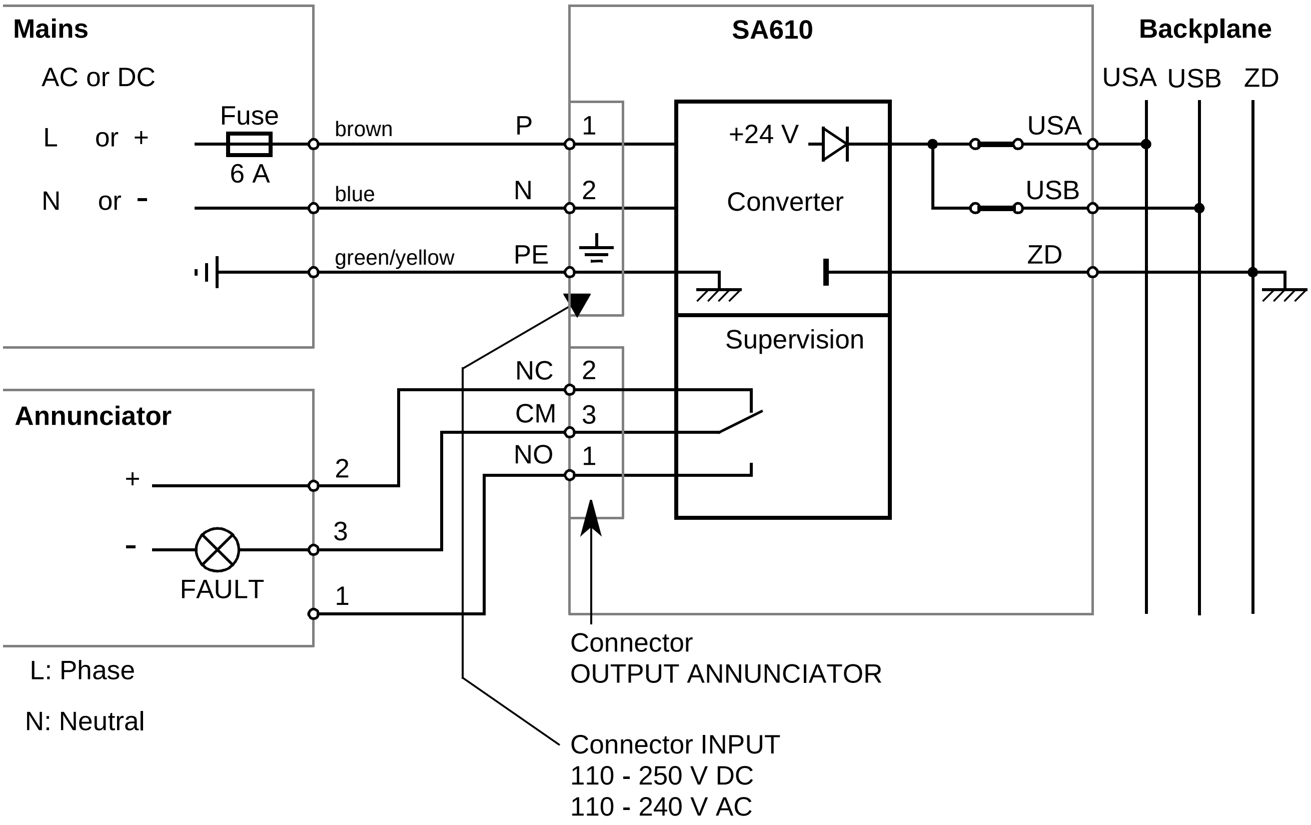


Figure 3-108. SA610 connections for single configuration

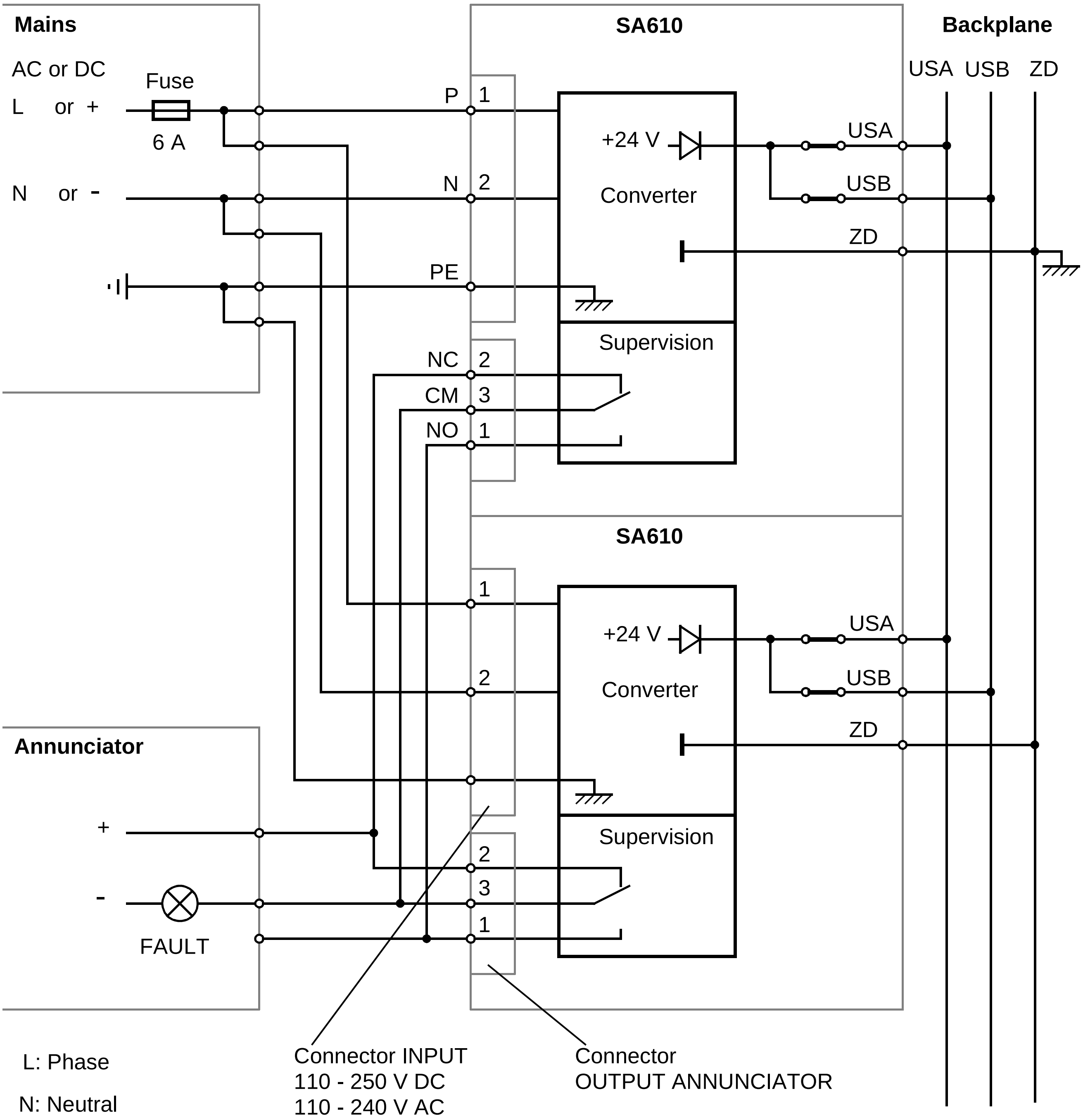


Figure 3-109. SA610 connections for parallel configuration

Functional description

The power supply module SA610 is designed to supply an Advant Controller 110 station. It is capable of supplying a typical station which includes up to 20 modules. The rated input voltage is 110 to 240 V AC (single-phase) or 110 to 250 V DC. The output voltage is 24 V DC (unstabilized). The maximum output power is 60 W.

The SA610 provides reinforced primary voltage insulation, includes excellent EMI filters and can buffer short primary voltage drop-outs.

Each subrack can accommodate a maximum of two SA610 so that, if the power requirement of an AC110 station exceeds the capacity of one SA610 module, further modules can be added up to a total of four SA610 modules for a station with two subracks.

The SA610 shall be inserted into the rightmost position(s) of a subrack.

The SA610 is a switched-mode power supply, which can be connected to either an AC or a DC input voltage. The power supply module will automatically adjust itself to the wide range of AC or DC input voltage. No user settings or adjustments are needed.

The state of the power supply is indicated by LEDs and by a relay contact.

There are three LEDs on the front of the module. A green LED (RUN) indicates that the module is operating normally and the output voltage is in the specified range. A red LED (FAULT) signals an overload. A green LED (Uin, behind the front door)signals that the input voltage is in the specified range.

There is a switch on the front (behind the front door), which is used to switch the output voltage ON or OFF. Notice that this switch does not disconnect the module from the mains supply.

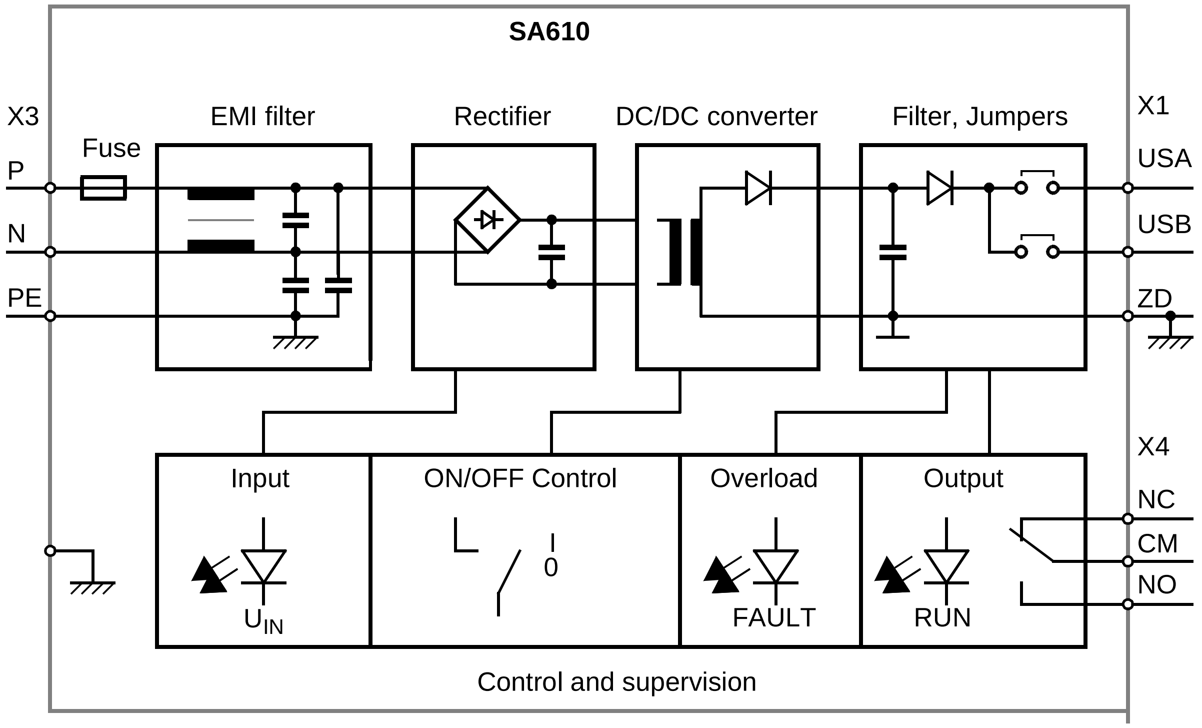


Figure 3-110. SA610 Block diagram

The power supply module SA610 consists of the following blocks:

- EMI filter
- Rectifier
- DC/DC converter with reinforced insulation
- Filter and two jumpers
- Control circuit and supervision

Jumpers

With two jumpers on the rear of the module, you can select whether the output voltage will be connected to USA, to USB, or to both USA and USB.

If the power supply module is used in a single configuration (only one SA610 for the whole AC110 station), the output voltage must be connected to both USA and USB. This jumpering is normally used for parallel configuration, too.

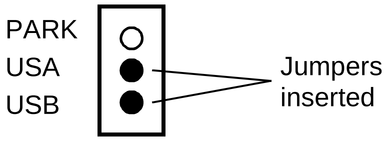


Figure 3-111. Position of the jumpers for single configuration

Parallel configuration

If the power requirement of a station exceeds the capacity of one SA610 power supply module, you can install up to two SA610 on each of the subracks, i.e., a total of four SA610 modules for a station with two subracks.

The positions of the jumpers are identical to those of the single configuration.

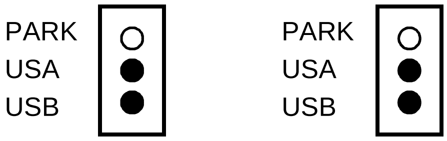


Figure 3-112. Position of the jumpers for parallel configuration

Supervision

The supervision of the SA610 detects and signals failures within the power supply. Signaling is done by LEDs and relay contacts (connector OUTPUT ANNUNCIATOR, X4).

Table 3-36. SA610 Supervision and indications

Condition	LEDs and relay contacts
Input voltage out of range	Green LED (U_{in}) is off, contact NC is closed
Output voltage in specified range	Green LED (RUN) is on, contact NC is open
Output voltage out of range	Green LED (RUN) is off, contact NC is closed
Output overload	Red LED (FAULT) is on

3.34 SC610

Summary

With the submodule carrier SC610, submodules (such as the multivendor interface CI532V01) can be used in the Advant Controller 110. The SC610 has slots for two submodules.

Associated data base elements

Associated data base element is SC610 for the submodule carrier.

Module replacement

The submodules can be replaced on-line without removing the submodule carrier.

The submodule carrier can be replaced on-line, but of course the submodules, which are installed in the slots of the submodule carrier, will stop working, too. No jumpering and no adjustments required.

Technical data

Table 3-37. SC610 Technical data

Submodule carrier	SC610
Current consumption	400 mA
Power supply voltage	24V

Oblique view

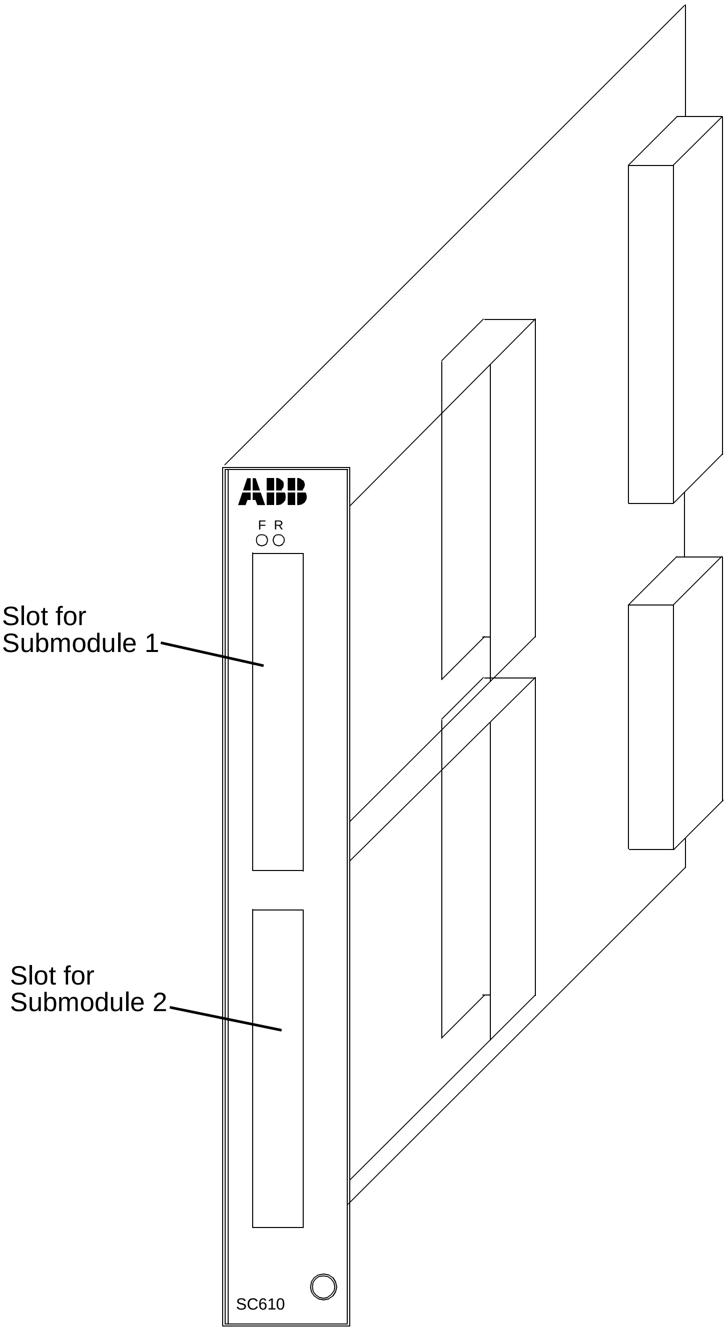


Figure 3-113. SC610 Oblique view

Connections

All connections, for example the connections of communication signals, are done on the submodules.

Functional description

With the submodule carrier SC610, submodules (such as the multivendor interface CI532V01) can be used in the Advant Controller 110.

Submodules can be inserted into two slots in the front cover of the submodule carrier. The upper slot is assigned to submodule 1, the lower slot is assigned to submodule 2.

The submodule carrier SC610 may be located anywhere in the AC110 base station or in an AC110 I/O station, but only one SC610 may be used in an AC110 base station and its I/O stations all together.

There are two LEDs on the front of the submodule carrier. A green LED (RUN) indicates the SC610 is configured and operating normally. A red LED (FAULT) signals a severe fault.

If the SC610 detects a severe hardware fault or a low power supply voltage, the green LED (RUN) is turned off and the red LED (FAULT) is turned on.

3.35 TC610

Summary

The Bus terminator TC610 terminates one end of the I/O extension bus.

Associated data base elements

None.

Module replacement

At the bus extender CI610 of the last I/O station, the bus extension cable TK610 and the bus terminator TC610 are connected together by a back-to-back adaptor of the CHAMP 24 pin according to IEEE 488, so it is possible to replace a CI610 without interrupting the extension bus.

The TC610 should not be replaced while the application program is running, because the whole data transfer of the I/O extension bus will be interrupted.

Oblique view

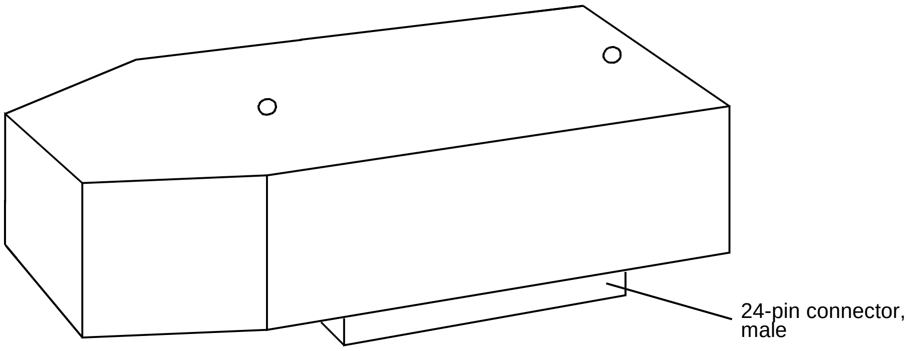


Figure 3-114. TC610 Oblique view

Functional description

Both ends of the I/O extension bus have to be terminated. The termination for one end is included in the bus extender module CI615. The other end of the I/O extension bus has to be terminated with the bus terminator TC610.

The TC610 has to be connected to the female connector of the last bus extension cable TK610. Note that the I/O extension bus doesn‘t work without the bus terminator.

Remark

There are two short screws delivered with the bus terminator. These screws are needed to fix the connector of the first bus extension cable TK610 to the bus extender CI615.

3.36 TC670

Summary

The TC670 is a passive terminator for MasterFieldbus. It is used to terminate the MasterFieldbus SDB (Short-Distance Bus), if a CI670 (communication module for MasterFieldbus (slave)) is located at the far end of the bus.

Associated data base elements

None.

Replacement

On-line replacement possible, but the whole MasterFieldbus will be down when the terminator is removed. No adjustments required.

Technical data

Table 3-38. TC670 Technical data

Passive terminator for MasterFieldbus	**TC670**
Termination resistance	120 Ohms
Number of resistors	3

Connections

The terminator TC670 is connected to the process connector TF620 of a communication module CI670. It is connected to the same screw terminals as the MasterFieldbus SDB.

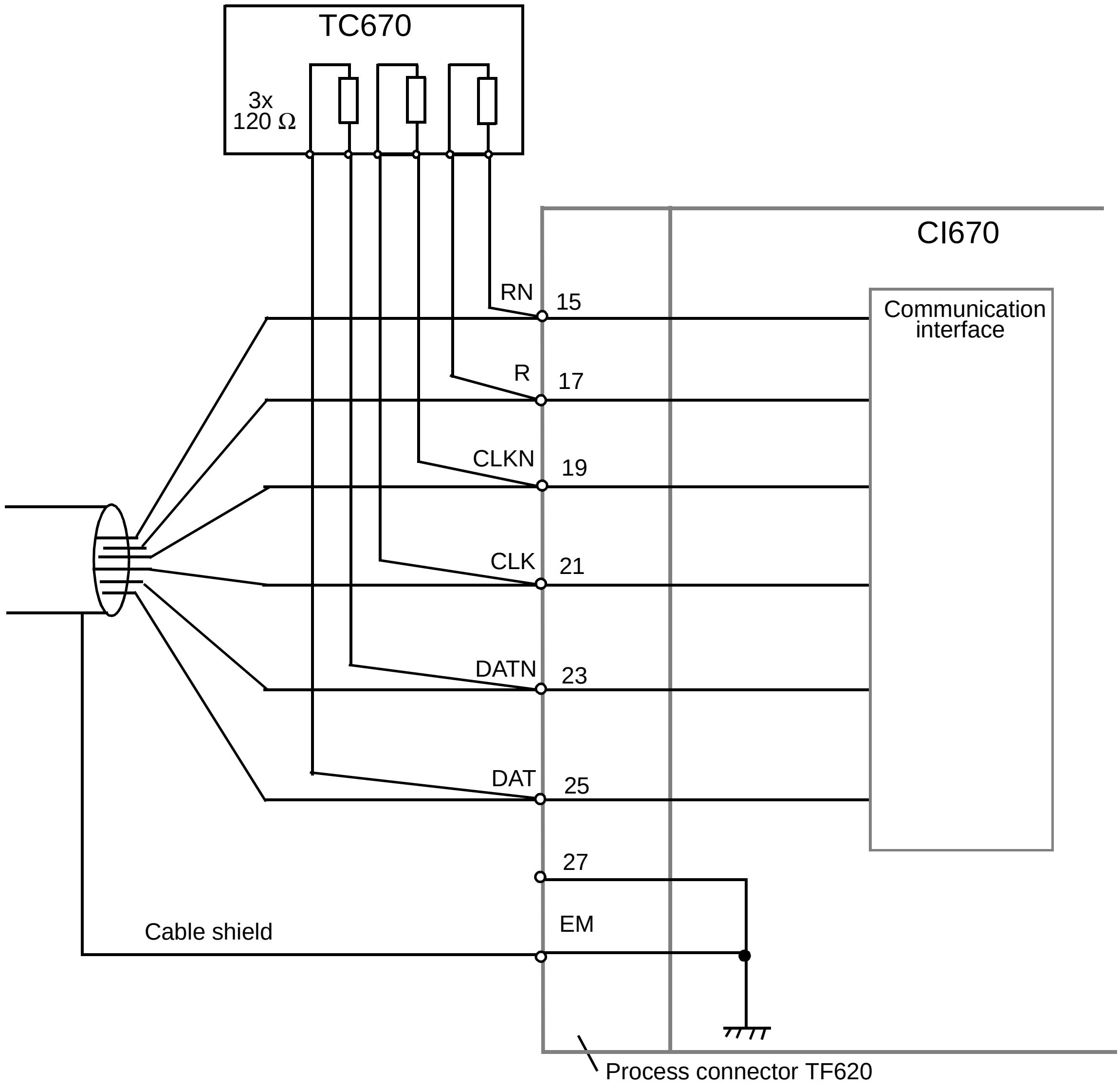


Figure 3-115. TC670 Connections

Functional description

The MasterFieldbus SDB (Short-Distance-Bus) has to be terminated at both ends with 120 Ohms. If a communication module CI670 is located at the far end of the bus, the terminator TC670 hat to be used for termination.

For more details about the MasterFieldbus see the manual *MasterFieldbus and S400 I/O*.

3.37 TF620

Summary

The process connector TF620 is used to connect the process cables to a module (e.g. I/O module). 50 screw terminals are provided for the connection of process cables and cable shield.

Associated data base elements

None.

Module replacement

In order to replace a module, you can remove the process connector from the module as follows:

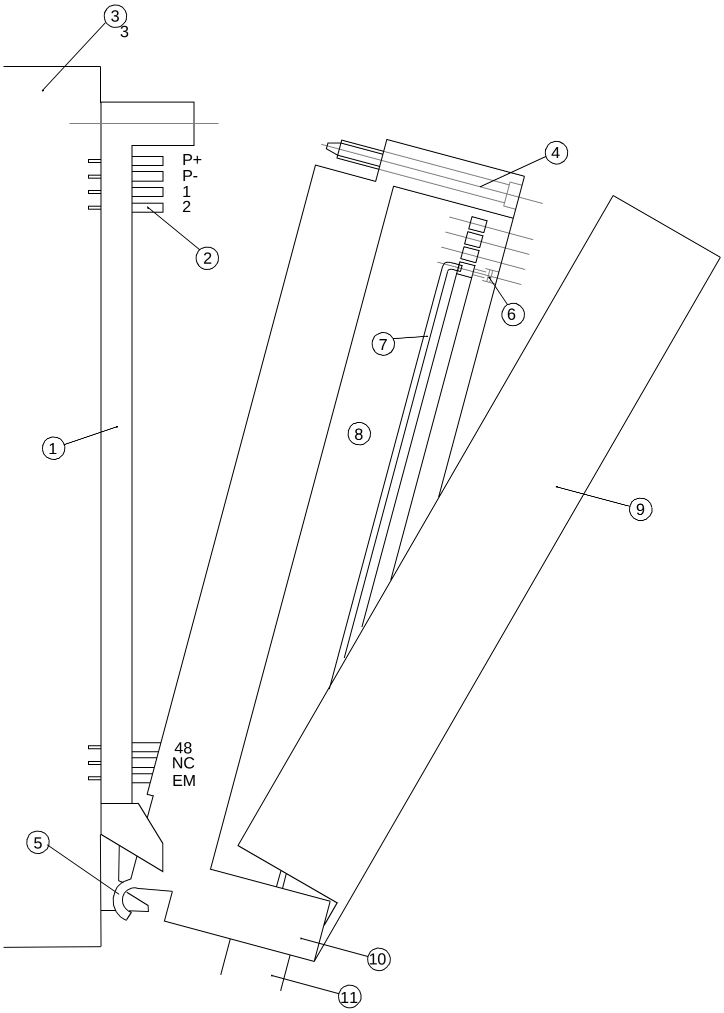
- Always observe the safety regulations, see Section 2.1, Safety regulations.
- Open the front door of the module
- Move (swing) down the cover of the process connector
- Loosen the fixing screw of the process connector
- Move (swing) down the process connector
- When the process connector is in the lower position, you can lift it a bit. In this way, the hook of the process connector will come free from the module.
- Gently pull the process connector away from the module.

Technical data

Table 3-39. TF620 Technical data

Process Connector	TF620
Contacts P+ and P-	Connected by wire jumper
Contacts 1 to 48	Screw terminals for up to 48 process cables
Contact NC	Normally not used
Contact EM	Screw terminal for cable shield
Wire gauge for screw terminals	0.5 mm^2 to 1.5 mm^2
Cable entrance part of the connector, opening	16 x 40 mm

Side view



① Multipoint connector plug (part of module).
② Blade contact.
③ PC board of the I/O module.
④ Fixing screw of for multipoint connector.
⑤ Hook.
⑥ Screw.
⑦ Process cables.
⑧ Space for process cables.
⑨ Cover.
⑩ Pivot.
⑪ Process cable.

Figure 3-116. TF620 Side view

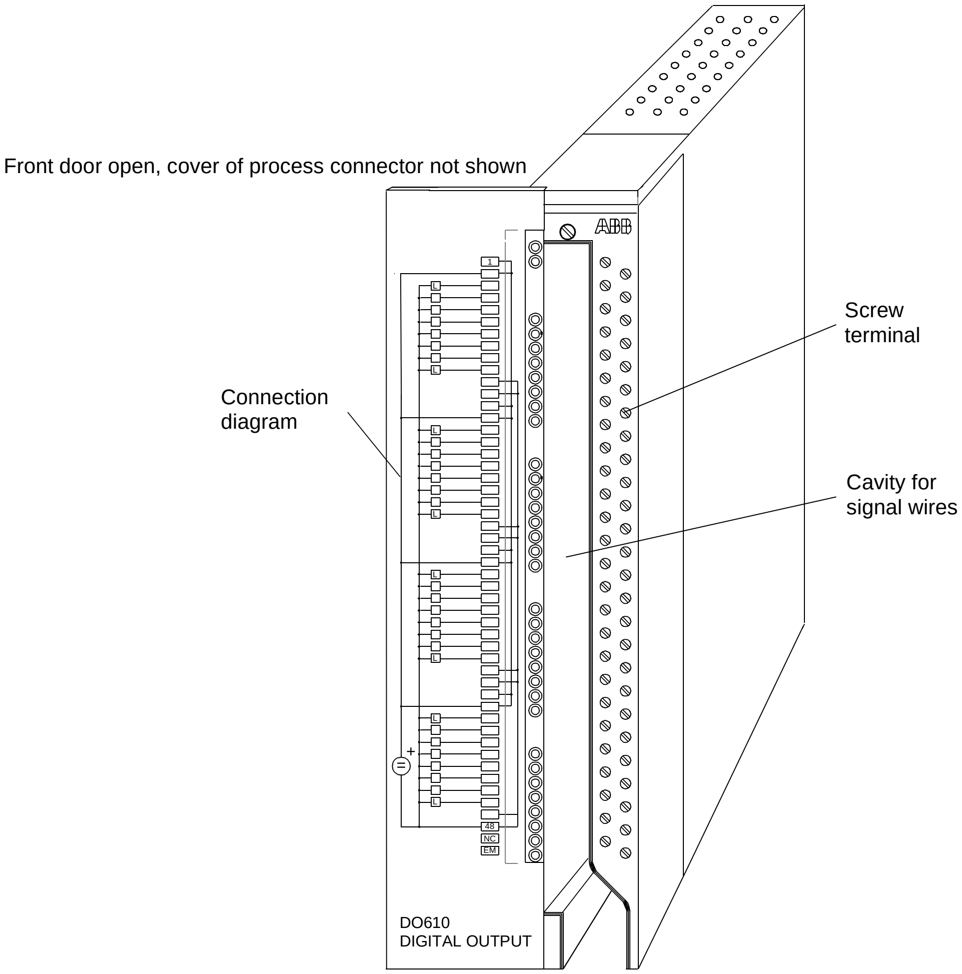


Figure 3-117. Oblique view of I/O module with process connector TF620

Functional description

The process connector TF620 is used to connect the process cables to a module (e.g. I/O module). 50 screw terminals are provided for the connection of process cables and cable shield.

The connector has 52 contacts, 50 of which are accessible and have screw terminals. The two uppermost contacts, marked P+ and P-, are connected by a wire jumper for a special use and are not accessible. Up to 48 of the screw terminal contacts are used for process signals. One contact is used for connecting a cable shield (EM) and one contact is normally not used (NC).

The screw terminals can accommodate wire gauges from 0.5 mm^2 to 1.5 mm^2. The connector’s cavity for the cable has a dimension of 24 x 40 mm. The cable can be clamped with two nylon straps. The wire entrance part of the connector has a dimension of 16 x 40 mm^2.

The connector is supplied with a cover fitted over the contacts, making it safe for high-voltage use.

3.38 TK610

Summary

The Bus extension cable TK610 connects a Bus extender module CI615 in the base station to a Bus extender module CI610 in an I/O station, or it connects a CI610 to another CI610 in the next I/O station..

Associated data base elements

None.

Module replacement

At the bus extender CI610 of an I/O station, the incoming and outgoing cables are connected together by a back-to-back adaptor of the CHAMP 24 pin according to IEEE 488, so it is possible to replace a CI610 without interrupting the extension bus.

To fit the cable to the bus extender, two (long) screws are supplied with every cable. The screws are sufficiently long to secure together two cable plugs or one cable plug and the bus terminator.

The TK610 should not be replaced while the application program is running, because the whole data transfer of the I/O extension bus will be interrupted.

Cable types

Three types of the bus extension cable are available. They differ only in their length.

Table 3-40. TK610 Cable types

Name	Length	Type Designation
Bus extension cable	2.5 m	Type TK610V025
Bus extension cable	5.0 m	Type TK610V050
Bus extension cable	10.0 m	Type TK610V110

Oblique view

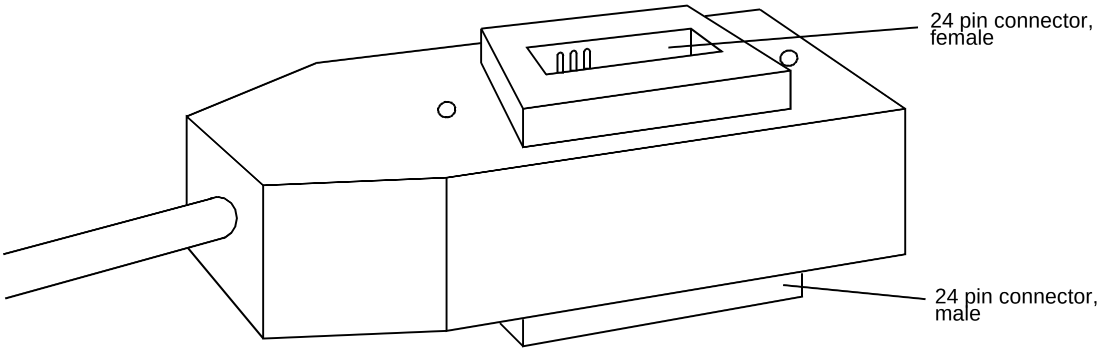


Figure 3-118. TK610 Oblique view of one end of the bus extension cable

I/O Bus connections

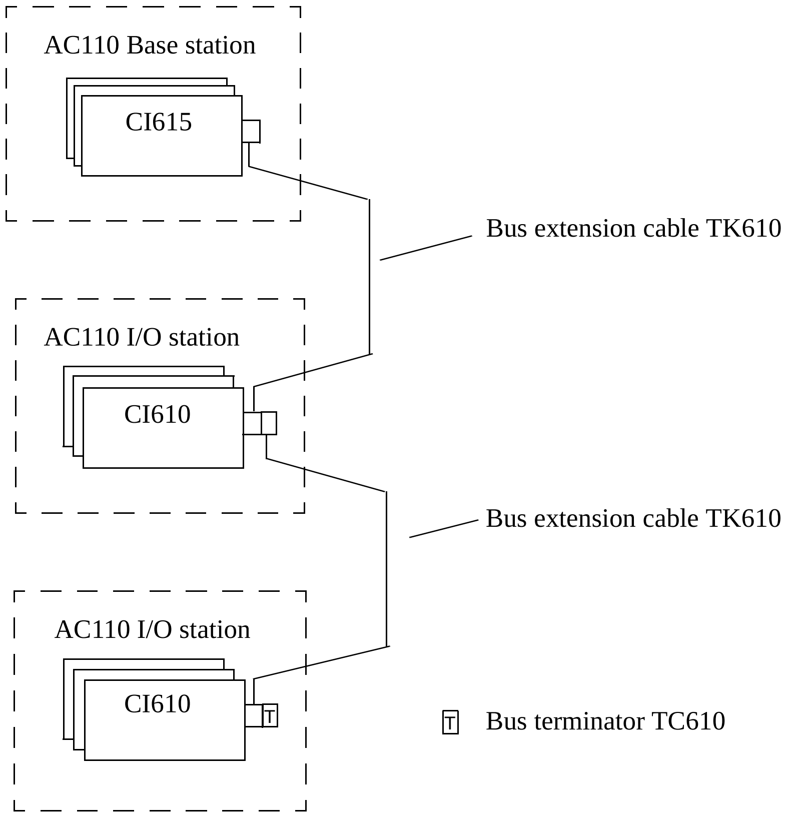


Figure 3-119. Connecting the I/O extension bus

Functional description

See data sheets of CI610 and CI615 for more details.

3.39 TK612

Summary

The bus cable TK612 is used to connect the backplane bus of the basic subrack to the backplane bus of the extension subrack.

It is not allowed to use other cables than TK612 for this purpose, because pin allocation, cable length and cable impedance have to be precisely optimized.

Associated data base elements

None.

Replacement

Switch off the power supply of the AC110 station before replacing the bus cable TK612.

No jumpering and no adjustments required.

Connections

The bus cable TK612 is connected to the sub-D connectors on the left of the subracks.

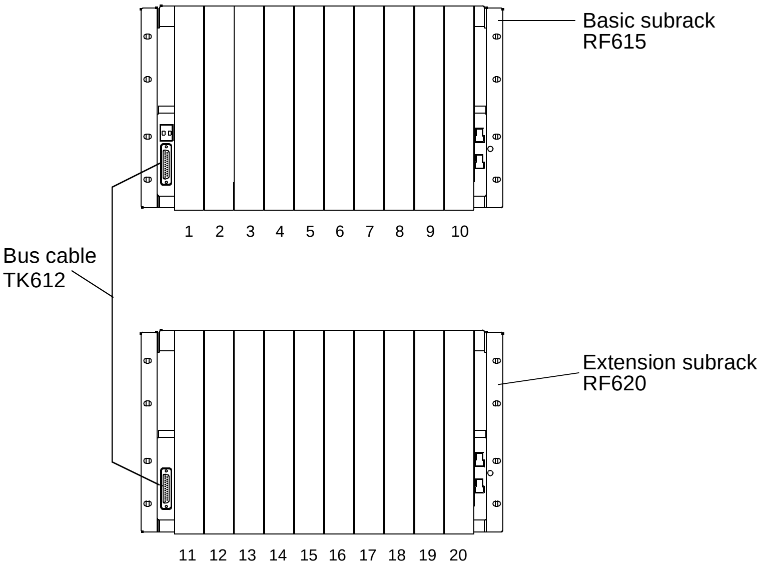


Figure 3-120. Bus cable TK612 connecting two subracks

3.40 TK615

Summary

The station voltage cable TK615 is used to connect the power supply of the basic subrack to the power supply of the extension subrack. Two station voltage cables TK615 are needed to connect both USA and USB.

Associated data base elements

None.

Replacement

Do not replace the station voltage cable while supply voltage is applied in the station. Switch off the mains supply of the **whole** station before you replace the cable.

Connections

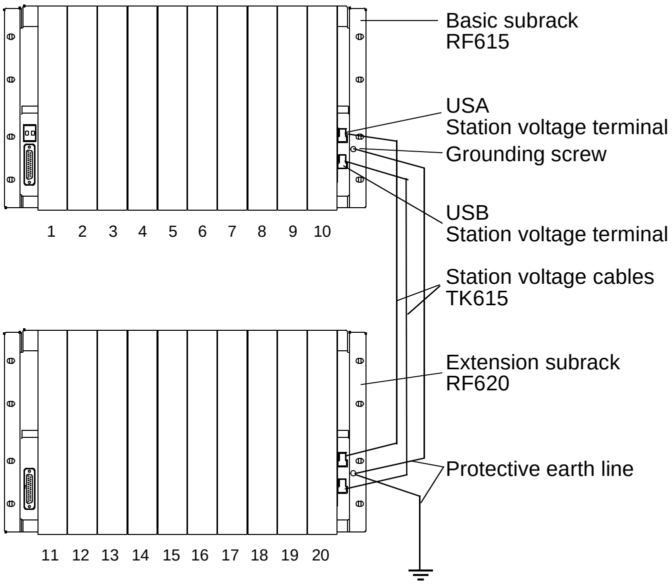
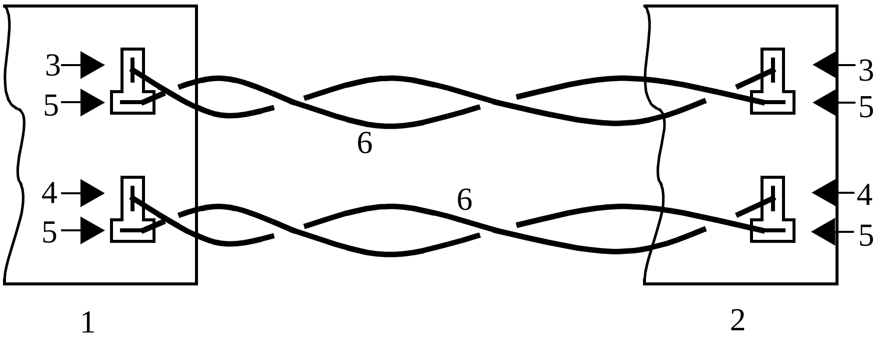


Figure 3-121. Two station voltage cables TK615 connecting two subracks

The station voltage cable TK615 is connected to the Faston terminals on the right-hand side of the subracks.



1) Part of base backplane
2) Part of extension backplane
3) USA terminal
4) USB terminal
5) ZD terminal
6) Cable TK615

Figure 3-122. TK615, Details of connections

Functional description

When an AC110 station consists of two subracks (basic and extension subrack), the station voltage terminals of both subracks must be connected together by a station voltage cable TK615. The TK615 consists of twisted copper pairs with Faston connectors.

Both the basic subrack RF615 and the extension subrack RF620 have terminals for linking the station supply voltages. These terminals are located on the right-hand side of the subracks. There are two sets of terminals, which enable you to connect the two tower supplies (USA and USB).

If redundant power supply is applied, two station voltage cables TK615 are required (one for USA, the other for USB).

The station must be earthed via a conductor protective earth (PE). Where both a basic and an extension subrack are installed, connect both subracks to the PE conductor (see Figure 3-121). Connect the PE conductor with a srew to the earthing/grounding hole located on the right-hand side of the metal base plate of the subrack.

3.41 TK630

Summary

The process connector TK630 is used to connect the process cables to a module (e.g. I/O module). It comes with 48 preassembled unshielded process cables, one side connected to crimp terminals of the connector, the other side simply cut off.

Associated data base elements

None.

Module replacement

In order to replace a module, you can remove the process connector from the module as follows:

- Always observe the safety regulations, see Section 2.1, Safety regulations.
- Open the front door of the module
- Move (swing) down the cover of the process connector
- Loosen the fixing screw of the process connector
- Move (swing) down the process connector
- When the process connector is in the lower position, you can lift it a bit. In this way, the hook of the process connector will come free from the module.
- Gently pull the process connector away from the module.

Technical data

Table 3-41. TK630 Technical data

Process Connector	TK630
Contacts P+ and P-	Connected by wire jumper
Contacts 1 to 48	Connected to 48 process cables AWG20 gauge wires
Contact NC	Not connected
Contact EM	Not connected

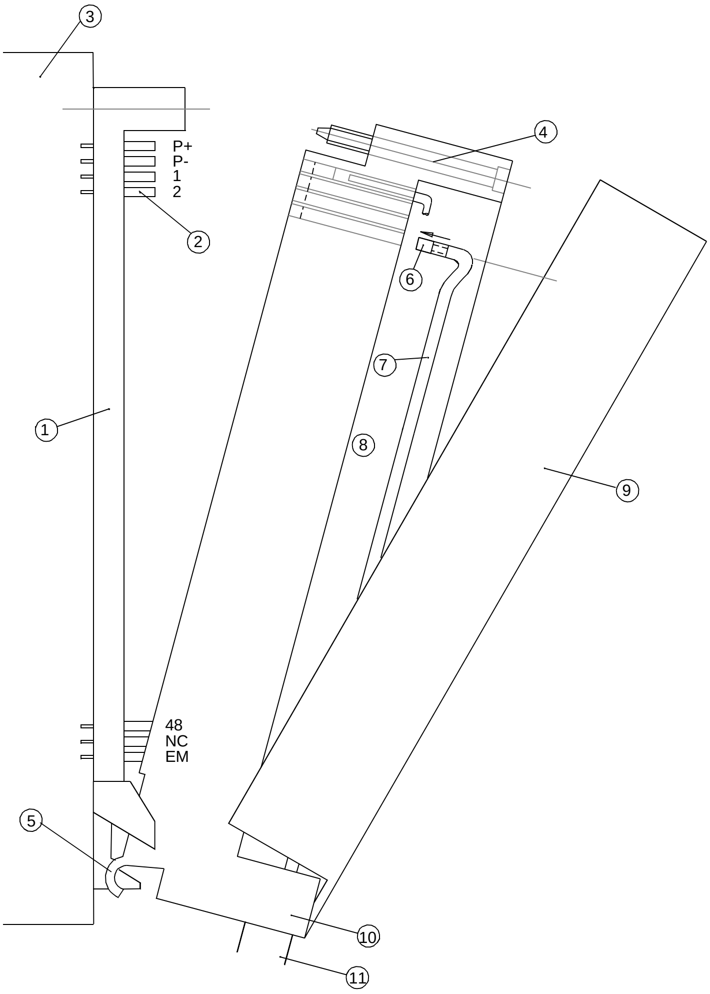
Table 3-42. TK630, Length of process cables

Type Designation	Length of process cables
TK630V025	3.0 m
TK630V050	5.0 m
TK630V110	10.0 m

Table 3-43. Technical data of process cables

Process cables of TK630	Specification
Wire gauge	AWG20 0.56 mm^2
Minimum bending radius	5 x cable diameter (flex class 5)
Rated isolation voltage	300 V
Cable flammability	UL-CL2
Wire identification	Each wire has its own number printed along the wire
Color of wire isolation	Black
Color of sheathing	Gray RAL7035

Side view



① Multipoint connector plug (part of module).
② Blade contact.
③ PC board of the I/O module.
④ Fixing screw for multipoint connector.
⑤ Hook.
⑥ Junior timer contact.
⑦ Process cables.
⑧ Space for process cables.
⑨ Cover.
⑩ Pivot.
⑪ Process cable.

Figure 3-123. TK630 Side view

Functional description

The process connector TK630 is used to connect the process cables to a module (e.g. I/O module). It comes with 48 preassembled unshielded process cables, one side connected to crimp terminals of the connector, the other side with loose ends (simply cut off).

The connector has 52 contacts. The two uppermost contacts, marked P+ and P-, are connected by a wire jumper for a special use and are not accessible. 48 of the terminal contacts are connected to preassembled process cables. The two contacts marked NC and EM, are not connected.

The connector is supplied with a cover fitted over the contacts, making it safe for high-voltage use.

The connector can be delivered with three different cable lengths of 3.0, 5.0 and 10.0 meters. The cables are connected to the process connector’s crimp contacts and are clamped in the cable entrance of the connector by a nylon cable strap. The other end of the cable is simply cut off, i.e., without any preparation. The wires are numbered along their whole length, so that the cable can be cut to any length without loosing the wire identification.

3.42 TK640

Summary

The process connector TK640 is used to connect the process cables to a module (e.g. I/O module). It comes with 48 preassembled process cables, one side connected to crimp terminals of the connector, the other side simply cut off. There is one common shield for all 48 process cables.

Associated data base elements

None.

Module replacement

In order to replace a module, you can remove the process connector from the module as follows:

- Always observe the safety regulations, see Section 2.1, Safety regulations.
- Open the front door of the module.
- Move (swing) down the cover of the process connector.
- Loosen the fixing screw of the process connector.
- Move (swing) down the process connector.
- When the process connector is in the lower position, you can lift it a bit. In this way, the hook of the process connector will come free from the module.
- Gently pull the process connector away from the module.

Technical data

Table 3-44. TK640 Technical data

Process Connector	TK640
Contacts P+ and P-	Connected by wire jumper
Contacts 1 to 48	Connected to 48 process cables AWG20 gauge wires
Contact NC	Not connected
Contact EM	Connected to cable shield

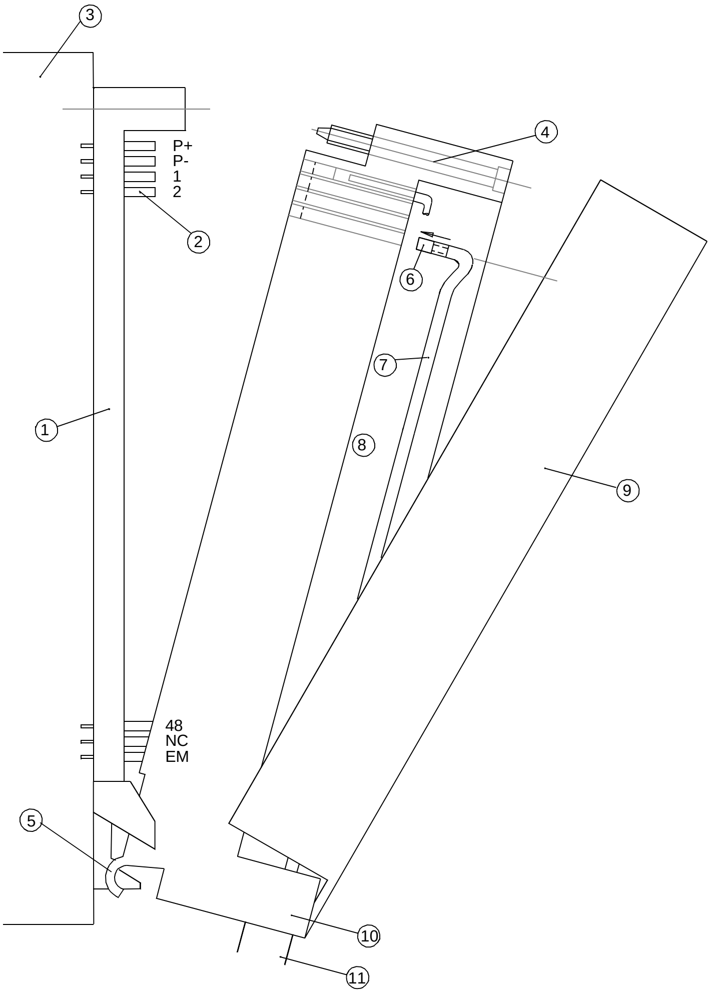
Table 3-45. TK640, Length of process cables

Type Designation	Length of process cables
TK640V025	3.0 m
TK640V050	5.0 m
TK640V110	10.0 m

Table 3-46. Technical data of process cables

Process cables of TK640	Specification
Wire gauge	AWG20 0.56 mm^2
Minimum bending radius	5 x cable diameter (flex class 5)
Rated isolation voltage	300 V
Cable shield	One common shield for all 48 process cables
Cable flammability	UL-CL2
Wire identification	Each wire has its own number printed along the wire
Color of wire isolation	Black
Color of sheathing	Gray RAL7035

Side view



① Multipoint connector plug (part of module).
② Blade contact.
③ PC board of the I/O module.
④ Fixing screw for multipoint connector.
⑤ Hook.
⑥ Junior timer contact.
⑦ Process cables.
⑧ Space for process cables.
⑨ Cover.
⑩ Pivot.
⑪ Process cable.

Figure 3-124. TK640 Side view

Functional description

The process connector TK640 is used to connect the process cables to a module (e.g. I/O module). It comes with 48 preassembled shielded process cables, one side connected to crimp terminals of the connector, the other side with loose ends (simply cut off).

The connector has 52 contacts. The two uppermost contacts, marked P+ and P-, are connected by a wire jumper for a special use and are not accessible. 48 of the terminal contacts are connected to preassembled process cables. The contact NC ist not connected. The contact EM is used for connecting the cable shield.

The connector is supplied with a cover fitted over the contacts, making it safe for high-voltage use.

The connector can be delivered with three different cable lengths of 3.0, 5.0 and 10.0 meters. The cables are connected to the process connector’s crimp contacts and are clamped in the cable entrance of the connector by a nylon cable strap. The other end of the cable is simply cut off, i.e., without any preparation. The wires are numbered along their whole length, so that the cable can be cut to any length without loosing the wire identification.

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